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USSR: Science & Technology Policy

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New Academy Vice-President Nefedov on Future of Chemistry Research

*18140084a Moscow IZVESTIYA in Russian
24 Oct 88 p 4*

[Interview by G. Alimov with Academician O. M. Nefedov, USSR Academy of Sciences vice-president, under the "Names and Events" rubric: "Initiative and New Ideas—Conditions for Progress"; first paragraph is IZVESTIYA introduction. Passages in boldface as published]

[Text] Academician O.M. Nefedov, a new USSR Academy of Sciences vice-president, will be responsible for developing chemical sciences in the country. He is 56 years old. He graduated from Moscow Chemical and Technological Institute and is a doctor of chemical sciences, professor and laboratory head at the Institute for Organic Chemistry imeni N.D. Zelinskiy. A great scientist in the fields of physical, synthetic and technical organic chemistry, he is author and co-author of 380 scientific works and more than 100 inventions. Under his guidance, 4 doctoral and 50 candidate dissertations have been fulfilled. He has also won the USSR State Prize.

IZVESTIYA: Oleg Matveyevich, chemistry is the great magician of the 20th century, and in the eyes of many it has earned the reputation of an evil magician. A complex, rather, let us say, chemophobia, a kind of fear of chemistry, has arisen among people. What is in the future?

O. M. Nefedov: No matter how much we curse chemistry, we ought to realize that we cannot get by without it. In my opinion, the fear of it which has arisen is a serious warning to all who are responsible for developing this area and for using its products in the economy.

IZVESTIYA: Are these fears justified? How can the peaceful "coexistence" of chemistry and mankind be ensured?

O. M. Nefedov: As far as our misfortunes are concerned, in my opinion, they relate in many ways to errors in the development strategy of the chemical industry or to serious shortcomings in many chemical industries, the unjustified cheapening of projects, an inadequate technical base, and frequent technological violations. For instance, the question of how to make industry maximally harmless and safe, albeit also more expensive, has not been asked. Today, we are reaping the fruits of this "economy" and all-acceptance.

IZVESTIYA: Where were the scientists? Are they prepared to share the responsibility?

O. M. Nefedov: Scientists should also not escape the blame. Indeed, many of us did not have enough courage to oppose these incorrect tendencies. Yet, at that time the circumstances made it easy for the decision-maker to not listen to us.

IZVESTIYA: What percentage does chemical production comprise of the gross national product?

O. M. Nefedov: It is small, 6-7 percent, although it reaches 10-15 percent in advanced industrial countries.

IZVESTIYA: Yet, with this low level, such unfavorable consequences of using chemicals in the national economy are occurring here?!

O. M. Nefedov: This, of course, is not the point. We lag sharply in terms of the assortment and quality of chemical products being produced. We often use those of which we have enough in a very incompetent or technically improper manner. Many chemical industries are already obsolete, but their modernization is being held back by a poor machine building base. Moreover, we suffered from gigantomania in its day. In some cases this was justifiable, but in many—absolutely not.

IZVESTIYA: How do you view the state of affairs in domestic chemical science?

O. M. Nefedov: We do have achievements, as it is usually said, of world class. However, it must be stated frankly that on the whole our chemical science is inferior to the world level in many areas. Of course, this does not mean that we have few chemists or that they are less capable or less devoted to their science. No. We have many weaknesses in training and using cadres and an inadequate technical base, but chemistry is primarily an experimental science. Any kind of experiment requires material support. In the recent past, the overall situation in our country did not promote the development of initiative and exploration, and without this there cannot be true progress, in science above all.

IZVESTIYA: Could you briefly formulate your program of actions as vice-president.

O. M. Nefedov: I will act with the certainty that the command-administrative principle of managing science is entirely unacceptable. Relying on the experience and help of my colleagues in the academy and in sectorial science, I would like to focus our efforts on priority areas, on creating the necessary technical base and developing and implementing principles which would enable the lower- and mid-level scientific employees to display their initiative and capability more extensively. Generally speaking, science is being done essentially by graduate students, candidates of sciences and doctors. It is very important that they be able to prove their worth under the new conditions. Initiative should be encouraged in all possible ways. We had dispelled peoples' desire to suggest and, moreover, be responsible for something. At a recent meeting in the academy, someone noted quite correctly: a scientific leader's task should lie in the fact that his coworkers interpret his ideas, suggestions and program as their own.

IZVESTIYA: Previously, the academy had no separate vice-presidential post for chemistry. One vice-president was responsible for both biology and chemistry. What caused the division?

O. M. Nefedov: Both sciences have been developing quite intensively of late. Biology and chemistry are both immensely and exceptionally important and responsible fields. However, of course, this division does not signify a delimitation. On the contrary, the integration of these fields, with other fields as well, is a necessary condition for the development of science and society on the whole.

IZVESTIYA: You are retaining the position of laboratory head at the institute. How do you view interrelations with its leadership now? After all, as vice-president, you will also be responsible for this institute.

O. M. Nefedov: I will behave as before, respecting and fulfilling the orders and instructions of the directors, which, naturally, are also sent to our laboratory. However, I will participate in discussing and drafting these decisions and in restructuring the institute, in my rights as a collective member. Regardless of post, a person must remain himself.

Reasons for Soviet Lag in Fundamental Research Explained

18140094 Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 18 Oct 88 pp 2-3

[Interview with Corresponding Member of the USSR Academy of Sciences Pavel Vasilyevich Volobuyev by V. Volnov: "If You Face the Truth. The Science of Moving Science. The Lack of Morality Threatens Stagnation"; date not given; first paragraph is SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[Text] For decades we were convinced that our "large-scale" science held the leading position in the world. And if it were not for the difficulties with introduction and with the implementation of bold ideas, we would.... But then the time of glasnost and sober evaluations began. And it turned out that even in basic research we lag in a number of leading directions. While "catchup" development became dominant for our science and technology. Such a grim conclusion was heard from the rostrum of the 19th party conference. In order to outline a program of actions, which follows from its decisions, and means of increasing the contribution of science to restructuring, the General Assembly of the USSR Academy of Sciences is beginning work today in Moscow. Corresponding Member of the USSR Academy of Sciences P. Volobuyev, one of our leading historians of science, also reflects on the problems which should be discussed at it.

P. V. Volobuyev: Science is one of the few fields of activity, in which scientists themselves evaluate the course and level of development. It would seem that the trust of society should have given rise to great responsibility and demandingness on oneself and others. But

instead of them an atmosphere of self-praise and complacency reigned in our science. To some extent it was possible to understand this in the early 1960's, when we successfully solved the atomic problem, led in quantum mechanics, and were the first to escape into space. But at that time, too, the entire front of science had not been pulled up in our country to the leading level. And then a period of steady slipping down began in full. The progress even in such fields, in which our scientists traditionally led—for example, in "pure" mathematics—slowed down.

Today our severe lag behind the leading countries of the West and Japan in the area of information technology and information science, which have become the cutting edge of scientific and technical progress, is arousing particular anxiety. Things are no better in a number of directions of microelectronics, biotechnology, and polymer chemistry, in which we risk entering even the 21st century in the position of laggards. Is that not why several scientists have begun to speak openly about the crisis in our science? A lack of ideas threatens it. But back 2 decades ago our scientists, especially in theoretical fields, advanced as many of them as in the United States.

It came to the fact that at the party conference one had to speak not about the use of the accumulated domestic scientific potential, but about the development of a qualitatively new one. But where is that one, the former one? Remember how we prided ourselves that we had more than half a million doctors and candidates of sciences alone. But we tried not to remember what their output was. Otherwise one would have to admit that, while having a fourth of all the scientific personnel on the planet, we are yielding, according to rough expert estimates, no more than 15 percent of the scientific output. And perhaps even less.

For comparison I can recall that at the beginning of this century in Russia there were approximately 5,500 professors. Of them only half dealt with science. But these were titans of thought. They placed Russian science level with world science. The scientific potential of prerevolutionary Russia in qualitative indicators was not inferior to the potential of the leading countries of the West. After October, when science got rid of the bureaucratic fetters and became self-managed, it began to work at full power. If it had not been for the mass repressions of the 1930's....

SOTSIALISTICHESKAYA INDUSTRIYA: Pavel Vasilyevich, does it not seem to you that we have already begun to remember these black pages in the history of the country not unintentionally? As compared with what was done in the 1930's, our own miscalculations and misdeeds seem trivial....

P. V. Volobuyev: One must not forget the nightmares of the past—otherwise they may be repeated. But this is a special theme. While I intend to speak only about science. Much of what is today preventing it from

advancing originated in the 1930's. And it consolidated its positions right up to the 1950's. Precisely at that time the interference of the bureaucratic administrative machinery in the affairs of science increased and incompetence and protective ideological trends gained the upper hand. Entire directions not only in biology, but also in other sciences were suppressed.

Already at that time basic research was inadequately financed, talented scientists, who dealt with the solution of "abstract" problems, were deprived of support. The bureaucratization of the very organizational structure of science occurred. Even planning turned into its opposite. Much research, which had been included in the plan, but had lost its topicality, all the same was continued. Either for the sake of the fulfillment of the plan. Or because the interests of a specific group of scientists or some scientific research institute were behind it. Science also did not escape the mania for percentages and the love of victory reports.

It is not worth deluding oneself: this entire bureaucratic bacchanalia has also flourished until now, placing the rank and file scientist in a dependent position and increasing the power of officials from science. It is constantly reminding one of itself by the multistage procedure of the consideration and approval of works, by the need to bow down to obtain numerous—often for trivial reasons—permits, and by the endless editing of finished works. But what is the practice of expert appraisal, which was as if specially invented for the delay of publications and their freeing from novelty, worth? This serves someone's purpose—it saves them from personal responsibility. But there was none of this during the first years after the revolution, when the attitudes toward science were based on confidence in scientists and their independence.

SOTSIALISTICHESKAYA INDUSTRIYA: Three decades have passed since the personality cult was debunked. Is it appropriate to cite it, if during the same period Japan was able to shoot ahead to be among the leaders of scientific and technical progress? Finally, what prevented our scientists from making a spurt during the past 3-5 years?

P. V. Volobuyev: We came into a grave legacy. The ossification of organizational forms, the poor technical equipment of our institutes, the low effectiveness of research—all these are not the worst of the troubles. In science, where talent, the boldness of thought, and the intuition of the scientist determine everything, the moral atmosphere is one of the decisive conditions. The bureaucracy from science tried to poison precisely it. And the intentional replacement of the true criteria of success with imaginary ones became one of the means.

It is well known, for example, that the world judges the importance of a work of a scientist by the so-called citation index—the number of references to it in other publications. In our country this indicator is being

deliberately ignored. Apparently, because on the average it is one-eighth to one-sixth as high as in the United States. But 2 decades ago we lagged behind the Americans only by a factor of 2.

It is not usual in our country to compare the novelty and promise of the research being conducted with the world level, with similar development abroad. As if science can develop in isolation, we invented a scale of evaluations of our own, among which it is possible encounter...the opinion of instances, a minister, and even the public. We also use this scale when awarding Lenin and State Prizes. Is this not why their prestige has declined? Moreover, it is well known that people, who nothing to do directly with the scientific or technical innovations, for which they have been given the high awards, get on the vast list of winners! Cases of the awarding of the prizes to obviously poor works are also well known.

It was the great Lobachevskiy who said that "it is necessary to build science on the firm foundation of morality." Unfortunately, many people, who disdained this rule, appeared in our midst. We are constantly faced with cases of undisguised careerism, indifference, and the use of the labor of subordinate scientific personnel, or else the direct appropriation of the results obtained by them. Worse than that, at the Ural Department of the academy the corresponding member, for whom its "brain trust" prepares not only articles and books, but even interviews for newspapers, became the talk of the town.

But take such a problem as scientific schools, without which the successful development of science is inconceivable. Some pseudopatriarchal groups, for which students and followers are selected not in accordance with their abilities, but in accordance with their complaisance, ties, and personal loyalty, have begun to appear in our country in place of them. Several scientific supervisors, including at Moscow State University, have mastered a quite unique method of training graduate students: they acquaint them with...the cleaning of their apartments and entrust them to walk their little dogs and to go to stores to make purchases. Degrees and titles, which have been obtained by no means for successes in a scientific field, serve as the reward for such toadyism. That is how clans and scientific mafias are formed. And the healthy spirit of competitiveness and the supremacy of knowledge and talent disappears from science.

SOTSIALISTICHESKAYA INDUSTRIYA: It seems to me that we have come right up to the problem of personnel. Therefore, I will venture an indiscreet question: What do you feel about the age restrictions on the right both to be elected a member of the academy and to hold management positions, which have been introduced at the USSR Academy of Sciences?

P. V. Volobuyev: The upsetting of the normal ratio between different generations is one of the main factors that contributed to stagnation. It is a matter not only of

the aging of scientific personnel—we actually lost an entire generation of scientists 40-55 years old, whom they did not let show what they could do at the most productive age. At our academy in the next few years the last leading lights in such fields as mechanics, mathematics, and physics will leave the scientific stage. While a replacement of equal value for them thus far is not visible in the next scientific generation.

In this connection it is not out of place to recall the results of one study which was conducted in France after World War II. A special commission was to have established why defeat befell the country. And it named as one of the reasons the fact that French professors retired at the age of 70-75, while in Germany they retired 10 years earlier. But this conclusion was based not on the fact the old people hindered the development of science—the productivity of the new generations of scientists was not used properly. In other words, the age restrictions, which have been introduced here, should be conducive to the influx of young people. But this is also a problem.

It worries me, for example, that in recent years people with average abilities, or else without them at all, have often been getting into science. The "questionnaire" system of the selection of personnel, which is in effect to this day, in particular, is guilty of this. Due to it, for example, the ranks of graduate students are often reinforced not by means of scientifically gifted people, but by means of so-called socially active people. An undergraduate, who has published his own work in an academic journal or has received an author's certificate for an invention, will hardly be accepted to graduate studies, if the secretary of the Komsomol organization of the faculty lays claim to this place.

I am not opposed to socially active people and even highly value their organizing abilities. Perhaps, they are irreplaceable at a works, in a trade union job. But what does science have to do with it? Among such candidates and doctors of sciences there are hordes of mediocrities. Hence, too, the abundance of so-called organizers of science. In other words, people who are striving merely to occupy director's chairs. Here it turns out that knowledge and degrees exist, but there are fewer and fewer generators of new ideas and scientists with a world name.

Take if only the statistics on Nobel Prizes. Even though this indicator suffers from a certain subjectivism. And still.... During the postwar years Soviet scientists have received 6 of them, while American scientists have received more than 60. But the saddest thing is that of the six commended works five were completed in prewar times, while the sixth was completed in the early 1950's! It is possible, of course, to cite the backward equipment of our laboratories and the meager investments in basic science. But let us face the truth: Did we always do and are we always doing everything so that only talented people would get into science?

Although I myself devoted about 10 years to party and soviet work, I cannot fail to mention another outcome of the era of stagnation. The "mass march" into science—for academic degrees and titles—of party, soviet, and ministerial personnel began already in the 1960's. The majority of them by no means strengthened it qualitatively. But a surplus of claimants to the role of "leaders" in science, organizers, and supervisors was created. Something similar is also occurring now in connection with the reduction of the staff of ministries. Apparently, if we want to raise the level of our science, serious restrictions should be imposed on this.

In my opinion, the search for and attraction to science of talented people and young people are the main task of those facing us. It is time to reject the romanticized notions about the infinity of talented individuals among our people. In my opinion, those people, who believe that the enormous number of war victims, the losses among the most active portion of the population as a result of the mass repressions, and, finally, the consequences of alcoholism undermined the genetic stock of our people, are right. The system of secondary and higher education with its orientation toward the utmost averaging out and leveling of the individual and toward the fettering of initiative and creative elements also "worked" a lot in this direction. In essence we have deprived the rising generation of opportunities for the display of talents. Where did the child prodigies, the child geniuses go?

SOTSIALISTICHESKAYA INDUSTRIYA: But I do not see reasons that would prevent the influx of personnel into science, if it would open its doors to them. And especially if it would begin to be concerned about their advancement.

P. V. Volobuyev: Apparently, you simply do not suspect the complications which await us. I am afraid that we will inevitably have to go through the aggravation of the struggle over talented people for science, literature, art, and the sphere of management. We should understand that it is necessary not only to seek, but also to support and protect in every possible way talented people. Let us face it, at some of our institutes prominent creative individuals find themselves in an openly hostile atmosphere. Their successes—like a disturbing element—are capable of turning for the remaining collective into a kind of fine rag.

On the other hand, I am certain that we cannot solve the problem of the "quality" of scientific personnel and the sharp increase of creative output, without having changed the views on the importance of their labor. It was only journalists of *LITERATURNAYA GAZETA*, who in other years could be indignant with respect to the exorbitant wages of our scientists. In reality in the remuneration of scientific labor—and this is during the age of the scientific and technical revolution!—we are far behind not only the developed capitalist countries and

the majority of socialist countries, but also many developing countries. Young scientific personnel have an especially difficult position: their wage is even lower than on the average for the country.

Need one be amazed at why the influx of creative young people into science has diminished so? Whether or not anyone likes it, we will have to agree that in the eyes of the new generation of scientists neither the spirit of selfless devotion, the joy of creative scientific work, nor other ideological motives can offset the poverty of daily life. Whoever hopes for a radical change in our science without changes in the remuneration of the labor of scientists, is—wittingly or unwittingly—a prisoner of self-deception. It is finally time to renounce the bureaucratic fear of paying too much for creative labor. Especially for discoveries and inventions.

Of course, the prestige of the labor of a scientist is determined not only by the wage. But with respect to other items we are as if on purpose also doing everything to undermine it. Thus, for example, our rayon party committees have become accustomed to regarding scientific research institutes and design bureaus as a reliable source of manpower for construction projects, vegetable bases, and "patronage assistance" to kolkhozes. And no one is asking himself the question: Into what costs is this turning for science? I personally know of a case, when a young physicist of ours, who was constantly diverted now for the construction of the Olympic stable, now for the repair of a Pioneer camp, now for the harvesting of potatoes, was not able to prepare the results of his research in good time for publication. And a similar solution of the problem soon appeared in an American physics journal.

I do not intend to dispute the opinion, for it is correct: at our scientific research institutes there is much dead weight. To put it bluntly, loafers. But loafers are everywhere loafers. They also know how to evade participation in "patronage assistance." Scientific associates, especially those working in the priority directions of scientific and technical progress, should be exempted once and for all from any forced labor.

SOTSIALISTICHESKAYA INDUSTRIYA: I do not want to argue with respect to the extent to which this suggestion conforms to the norms of socialist justice. It is a question of another thing: neither a high wage nor exemption "from potatoes" will replace knowledge, consistency of aim, and an aptitude for analysis and generalization. Where will be get such people?

P. V. Volobuyev: You yourself have answered your own question: the successes of science begin with the years at a higher educational institution, with the training of a talented reinforcement. Unfortunately, the ban on the combining of jobs had the result that our leading scientists, including academicians and corresponding members, for many years were "removed" from VUZ lecture halls. And today the return to them is accompanied by all

kinds of obstacles. But at the time, when I was an undergraduate, scientists of the academy not only conducted lessons—in the process of instruction they themselves selected the students, who were most capable and inclined to creative scientific work. And they invited them to graduate studies and for work. In my opinion, the higher school should be restructured in precisely this way, with an aim at the training of personnel for science.

It is also impossible not to recall the longstanding tradition of Russian science: after graduating from a university its graduates, who were retained for training for the title of professor, were sent abroad for practical study. The majority of outstanding Russian scientists went through this school. This tradition was also preserved during the first years of Soviet power. For example, P. Kapitsa worked for E. Rutherford, A. Ioffe worked for W. Roentgen. Such practical studies were very useful: informal scientific contacts arose, it was possible to obtain the necessary information from primary sources, and an opportunity was afforded to work in the leading laboratories. It seems that it is necessary to revive such a practice without fail.

It is finally time to learn that the world scientific community is developing rapidly owing to intensive information exchange. But in our country from year to year the limits of currency for the purchase of foreign scientific journals are being reduced. During the 1920's and early 1930's the country was immeasurably poorer, but the needs for scientific and technical literature were met much more completely. Incidentally, owing, apparently, to bureaucratic prejudices the obstacles to the publication of our articles abroad are also being preserved. It is still a good thing that they have simplified the official registration of trips abroad!

SOTSIALISTICHESKAYA INDUSTRIYA: Pavel Vasilyevich, we have been living more than 3 years now under the banner of restructuring. Do you believe that it has changed anything in science? Or are some additional steps still needed?

P. V. Volobuyev: It seems to me that although restructuring has affected science, for the present it has not done so particularly profoundly. Democratic principles, glasnost, and frankness are slowly becoming a part of our life. But without them it is difficult to expect that the "scientific patrimonies," which some institutes, departments, and laboratories have become, will turn again into creative collectives. Thus far the rapid increase of creative activity, the revival of debates, and the equal struggle of scientific ideas and opinion are also not visible. Many people have simply given this up. While it is so easier for others to retain their monopoly position in this area of science.

In attempting to change the course of events, the new management of the Academy of Sciences adopted a number of decisions, which are aimed at the increase of the role of our departments and at the broadening of democratic principles. But in real life they are turning for

some reason into half measures. Apparently, we all still have to realize that in an atmosphere of bureaucratic suffocation and bureaucratic regulation there can be no large-scale science, no large-scale literature, and no large-scale art. For the main thing dies away—the freedom of creative scientific work, the fearlessness of searching, and service to the truth and only it.

We still have to create such an atmosphere. Perhaps, at the price of considerable efforts and expenditures. I understand that during the years of stagnation a large

number of most urgent problems, which await immediate solution, accumulated in the country. Among them the most important of the most important ones is the increase of the standard of living of our people: it is finally time also to let them—the trailblazers and the much suffering ones—to taste the fruits of modern civilization. And all the same we are obliged to take immediate and comprehensive steps in order to ensure the leading development of our science. The future of socialism in our country, our national survival, and the fate of peace throughout the world depend on this.

**Wage System Reduces Productivity of S&T
Research Institute**

18140095a Moscow PRAVDA in Russian 20 Dec 88 p 2

[Article by G. Kadyshev, a CPSU member since 1954 (Odessa): "The Contribution and the Salary. No One Should Receive Money Just Because He Goes to Work"; first paragraph is PRAVDA introduction]

[Text] The article "Creators and Drones" (PRAVDA, 10 October 1988) raises one of the urgent problems of our society. The theme of the creative activity of specialists merits extensive discussion.

I work in the area of sectorial science, the task of which, according to common sense, is to use as extensively as possible in the national economy the latest scientific and technical achievements and to raise on this basis the entire level of production. However, not only our All-Union Scientific Research Institute of the Canning Industry, where I work, but also all sectorial science, with the rarest exception, are not performing this basic function today. I am personally enthusiastic about science and invention and have behind me tens of recognized inventions and even more inventions, which are at the stage of state appraisal. Although these inventions lead the world scientific and technical achievements and in case of implementation can yield an economic impact of more than 1 million rubles a year at just one enterprise, they are not finding a way into practice. Let us try to understand the causes of such a situation.

The institute, at which I work, is a typical institution of sectorial science, and in it the problems of all science are repeated as in a drop of water. According to my observations, which colleague share, a good half of the people at the institute are not performing productive work at all. They conscientiously go to work, even are not late, since there is strict accountability for being 5 minutes late, but during working time engage in whatever they like, only not work in essence. This is the fulfillment of public duties, participation in various conferences, meetings, and sessions, garbage collection campaigns, trips to outside enterprises and to kolkhozes for providing "patronage assistance".... But most of all simply idleness.

The other half of the specialists work half-heartedly and fulfill 90 percent of the time far-fetched work, which is not needed for the solution of arising scientific and technical problems. They "invented" this work at the same institutes and through superior economic subdivisions imposed its fulfillment.

Thus, the institute is working at no more than 20-25 percent of its potential. Here no one admits out loud that in essence he is doing nothing. On the contrary, every time, when it is necessary to complete one job or another, people on various pretexts evade its fulfillment.

Why is this happening? The point is that all the personnel of the institute "are sitting on salaries." They are being paid because they hold a position and go to work. This remuneration does not depend on whether a person has done something necessary or he is not working, but is only simulating activity.

The accomplished "restructuring" of the remuneration of labor here reduced to the fact that they increased the salary for someone, while they reduced it for someone else. But the principle here remained the same—the salary was assigned to a person in advance, regardless of whether or not he will work productively. The salary system does not leave room for remuneration in accordance with the results of labor. In case of this system no one has the right to earn, therefore, it makes no sense to work productively.

It is clear that it is much more difficult to work productively than to simulate labor or to do nothing. But inasmuch as labor itself is not paid for, there are fewer and fewer people who want to work productively. Under these conditions even conscientious personnel, who are willing to work productively without the remuneration of labor, are experiencing pressure on the part of those who are simulating labor activity.

From my own experience and from the example of other personnel I am observing what kind of resistance the attempts to develop anything original and useful encounter. Of what do they not accuse the creator, who goes beyond the overall idleness. They even accuse him of the fact that he is inventing for himself personally, since he wants to get royalties.

On the other hand, the established system of the financing of sectorial science encourages idleness and does not create the conditions for the development of advanced highly efficient equipment.

Assets are released for the development of a specific set of machines regardless of whether the developers have highly efficient technical solutions (inventions), which make it possible to produce an item which leads world achievements.

Most often developers do not have such technical solutions, but they have allocated to them a sum for the development of an item. Under these conditions it is senseless to seek inventions in the patent collection, to carry out their scientific and experimental analysis, and to incorporate them in an item. This is difficult and requires intense creative labor. It is much easier to copy old machines under the guise of new ones and on their basis to complete the work, which the majority of developers also do.

I have personally attempted repeatedly to interest developers in highly efficient inventions, in order to incorporate them in machines that are being developed. However, all the assets for the development of items were

distributed in advance among the copperformers, who "are not obliged" to do anything new; there are no assets for the development of an invention.

But who will undertake to do difficult creative work free of charge? Here the missed opportunity does not interest either the client or the developer, since the consumer, whose interests are not represented here, would derive advantage from the item. Taking into account the technical backwardness of canneries, a creative brigade of specialists of our institute came forth with the initiative to produce at the Odessa Cannery a unit for the cooling of cans, which improves the quality of the output being produced. The director of the plant whole-heartedly supported the initiative. However, when it came to the specific work on the production of assemblies and parts, it turned out that the engineers and workers of the plant did not want to perform this work. The point is that all of them are on salaries and no one will pay them for the additional work.

Two years ago, a group of inventors and I invited the USSR Ministry of the Medical and Microbiological Industry to test and introduce in the sector seven of our inventions. Each of them in case of introduction at just one plant will yield an economic impact of more than 1 million rubles a year, while one of the innovations makes it possible at least to double the yield of products from operating equipment.

Under the pressure of an instructor of the CPSU Central Committee the ministry considered all the proposals in its technical council, which recognized these inventions as useful for the sector and recommended that they be tested. In 2 years a folder of useless correspondence with personnel of the ministry has accumulated, but the implementation of the proposals has not progressed one step.

The entire structure of the ministry even after restructuring and the establishment of the Main Scientific and Technical Administration proves to be inefficient. It not only is not seeking efficient technical solutions, but also "is spitting out what they put in its mouth." Why? It turns out that given the new structure all the officials are also on salaries. They pay them for the position, for the fact that they go to work, but they do not pay anyone anything for work itself, for its results. And inasmuch as this is the case, the people prefer to simulate activity, and not to work in essence. It turns out that the subdivisions of the ministry and the ministry as a whole do not need to earn money. They live by fleecing subordinate enterprises, and not by earning money by performing useful work for enterprises. Although the plants of the USSR Ministry of the Medical and Microbiological Industry in technical and economic efficiency are one-fourth to one-half as good as analogous enterprises of western firms, no one intends to raise their efficiency to a modern level.

Instead of this the ministry is trying to prove in the government that for the increase of the output of products it is necessary to build in addition more than 15 plants, for which state investments of more than 2 billion rubles are needed. And imagine, enormous investments are being allocated to them at the expense of the state. Here money is being allocated not for the increase of the efficiency of operating works on the basis of inventions, but for the construction of the walls of new inefficient plants.

Under these conditions our proposal to double the output of products at operating plants just by introducing one invention undermines the opportunities to obtain enormous sums of investments—free money for the department. What official would reject such "abundance"? None of the personnel of the ministry needs the saving of assets and the decrease of the product cost, the ministry also does not need them, since the saved assets all the same will be confiscated for the statewide kettle and will go to whoever is working poorly, that is, will be used for the fattening of drones in other sectors.

Hence it is clear that not individual people and officials are to blame for the formed situation. The defect was incorporated in the economic system itself, which deprived the personnel of all production and management units of a material interest in the results of their labor. Precisely the existing economic system reproduces drones and suppresses creators at all levels.

The establishment of such an economic system, in which all the units and all the personnel, starting with the work and ending with the minister, should earn money, should earn by their own labor, and only through the economic results of their labor should make their own well-being, should become the central unit of all economic reform.

No one should receive money because he holds a position and goes to work. A position and attendance at the workplace are only an opportunity for work, an opportunity to earn. Here every participant in the labor process should strictly receive payment for the performed work in conformity with its economic result.

The administrative command system gave rise to many socioeconomic myths that the Soviet individual ostensibly works for society, the state, the country! This does not conform to reality. Meeting with people, I have always been convinced that the motive of the labor of each person is the meeting of his personal material and spiritual needs.

It is another matter that the state and society as a whole meet their own needs by means of the labor of working people. But to present this as the personal motive of the labor activity of a person means to replace reality with a myth. Who needs this myth and why? It is clear that those, who wish to live by the fruits of the labor of others, need it. Such people exist at all levels of the social

structure—from the worker to the minister. They zealously cultivate the myth of the work of a person ostensibly for society, in order to replace the measure of labor and consumption and to erase the boundary between creators and drones.

Here it is no longer the labor contribution that determines the significance of a person in society, while the place held by an individual in the administrative system acts as the standard. It is absolutely necessary to restore economic interrelations in the labor and social activity of society. Money should be a measure of the labor contribution of a person and constitute a subject of his pride. The sum of earned money is the amount of recognition by society of the labor contribution of a person and a measure of the mutual obligations of society to a person.

Success of Monetary Stimuli at Machine Building Association

18140095b Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 23 Dec 88 p 2

[Article by V. Volnov, staff member of the Poisk Scientific Production Association of the State Committee for Inventions and Discoveries (Odessa): "Introduction? No Problem!"; first paragraph is SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[Text] For some time incredible rumors, it would seem, began to spread among the restless tribe of inventors. They say, somewhere in the southern part of the Ukraine there has appeared an enterprise, envoys of which are traveling about the country in search of inventions. And the innovations that are used are taken, as they say, right off the drawing board. And they pay the awards to the authors without delay.

It turned out that this rumor arose not in a void. About 5 years ago an all-union seminar, at which the experience of the local Kislrod mash Scientific Production Association in the saving of material and manpower resources was examined, was held in Odessa. And it turned out that precisely this association provided food for the conversations about the "inventors' El Dorado."

True, at first no one at the association thought about the purposeful introduction of inventions. It was a question only of the efficient use of metal, with the deliveries of which difficulties arose time and again. Meanwhile the Kislrod mash Scientific Production Association, of which the Avtogen mash Plant and the Scientific Research Institute of Technology of Cryogenic Machine Building are a part, consumes much of it. And of various types. Therefore, even the slightest irregularity in supply struck a painful blow to the economic indicators of the association.

At that time the idea of the "preservation" of the level of consumption of metal also originated. It consisted in saving resources as much as possible in case of the

further increase of production volumes. And, by means of this, in giving up the need to endlessly "drum up" additional capital and limits. In other words, this idea already then was spearheaded against the resource-wasting mechanism of management, which, in spite of the fire of merciless criticism, is also flourish well in our country to this day.

They implemented the idea by means of an integrated material resource management system (SUMR), which encompasses all the units of production, starting with the conception of an idea and ending with the supervision of the use of finished items by the consumer. The bulk of the system was backed by specially formulated "standards," which specify the resource-saving orientation of all the work of any of the subdivisions of the scientific production association. Here every member of the labor collective—from the director to the machine tool operator—firmly knew that a reasonable solution on the saving of resources, which had been found by him, would encounter approval, while the author would be given a material incentive. In particular, the sharp increase of bonuses—from 15 to 50 percent of the saved amount—played a large role.

The results were not slow in showing. In the time gone by the volume of consumption of both ferrous and nonferrous metal here has remained at the 1975 level, although the production of gas-cutting machines and cryogenic and oxygen units has increased by nearly twofold. And another enterprise, which could boast of a similar achievement, will hardly be found in the country.

Under the new conditions it is required of the developer to "invest" in an item as little material as possible and to achieve the minimum metal content. For the designer the achievement of this goal became not only a matter of professional prestige, but also a means of receiving a very sizable material reward.

It is very important that the emergence of new developments was immediately coordinated with the technological preparation of production. Moreover, they did this without the slightest delay. For example, the production of a new item, which envisages up to 3,000 technological operations, is made ready in the association on the average in just 2 (!) months. Such mobility in many respects is explained by the system of the automation of design and technological development, which has been set up in the scientific production association.

The interpenetration of planning approaches to the saving of resources and scientific and technical progress led the scientific production association to long-term and goal-oriented relations with scientific institutions and increased the "science intensiveness" of production. Now the Kislrod mash Scientific Production Association is cooperating with inventors of nearly 60 academic institutes, sectorial scientific research institutes, higher educational institutions, and planning organizations.

The expenditures on such cooperation come to 1.5 million rubles, while the return has already exceeded 6 million rubles.

A kind of conveyor of the use of inventions and resource-saving changes, which are made in the design and the technology of the production of each item, is in operation in the scientific production association. They do not wait until a design becomes obsolete, but annually introduce what researchers, designers, and process engineers have prepared. The gap between the emergence of an idea and its checking in practice is being narrowed literally to several months. Moreover, the processes of updating are of a continuous nature.

The experience of the Kislodmash Scientific Production Association has already gone beyond the original framework of the combating of "resource mania." In principle it is a matter of much joint work of designers, process engineers, workers, and the entire collective of the association on the introduction of new methods of management, on the planning of technical progress, and on the establishment of highly efficient production, which makes it possible with the optimum expenditures to produce new equipment at the level of the highest world models. But since one enterprise has been able to achieve this, and during not the best times for our economy, why should others not follow this example?

Continuing Secrecy in Science Questioned

PM1901143589 Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 15 Jan 89 p 2

[Article by Doctor of Technical Sciences Professor L. Barskiy: "Time of Glasnost and Time of Secrecy"]

[Text] Please forgive me. I know that it is not customary to talk and write about this. Just as it is not customary to talk or write about the intimate side of life. Everyone knows that it exists. But they pretend it does not. We have already admitted the existence of prostitution, corruption, and drug addiction. But we speak of secrecy only in connection with the past. Although it would be worth wondering: Is there not a lot of secrecy in the era of glasnost? At any rate, at least three questions need frank answers: Are all the secrets that we protect state secrets? How much does this protection cost? And, who needs it?

It would seem absurd to make a secret of a backward production facility, archaic technology, computers of past generations, and enterprises that pollute the environment. But we do. It is obviously because, as we lag behind, the number of secrets is reduced, which cannot be said of the apparatus designed to protect them. So the unpublished [negasnyy] order to continue to protect them is not admitted. Why? If only not to ruin our prestige.

Classifying is always permitted. But a certain audacity is needed to declassify something; it is a process fraught with difficulty. That is why the process of classification in our country is almost irreversible. It creeps on, gradually going beyond the framework of common sense. And so scientific and technical secrets known to the entire world remain a secret to the engineers of the neighboring plant engaged in a similar matter. And the intersectorial exchange of ideas, manufacturing processes, and inventions is totally impossible. The overall standard and pace of the development of technology are steadily declining.

Hypotheses and scientific ideas and theories would in general not seem to be subject to classification. But the lack of precise boundaries between science and technology here, too, helps to "obscure the issue." The bureaucratic principle whereby it is simpler to ban than to authorize is at work. Following this principle, bureaucrats of all ranks are trying to turn the very principle of accelerating the idea that "everything that is not banned is permitted" into its diametric opposite.

One of the "favorite" spheres of secrecy is our resources—natural, raw material, economic, and semi-finished material resources. In the era of satellites and computers that can calculate all industrial links and expenditure coefficients [raskhodnyye koeffitsienty], data about our resources become widely accessible and are known to specialists, in addition to our own economists, of course. From this it is clear how little logic there

is in protecting the coordinates and volume of stocks of minerals. Who will steal them? And who is interested in them if we take 15-20 years to develop deposits using our own efforts?

Until recently the pandemic of secrecy was justified by the need to protect defense information. But new times have come, and the policy of cold war and confrontation has given way to talks on disarmament and the treaty on the elimination of an entire class of nuclear weapons. Plans for the production of intermediate-range and shorter-range missiles are subject to inspection and continuous observation. But the restructuring of political thinking still does not guarantee the restructuring of the bureaucratic apparatus. That is another department.

A typical situation is for departmental secrets to be protected more vigilantly than state secrets. This priority can easily be explained by the possibility that official omissions and scandals may be discovered. Their revelation involves the threat of unpleasantnesses for specific people while the revelation of state secrets is not so dangerous. So departments try to promote their secrets to the rank of state secrets. Only this can explain the phenomenon of the prolonged concealment of information about accidents, environmental pollution, fires, epidemics, and other misfortunes of ours. In brief, items about all kinds of misfortunes are impeded not so much because we are "poor but proud," but to conceal our omissions and the unseemly state of affairs.

For some reason the champions of secrecy do not notice or do not want to notice that the world situation has changed substantially. Not only compared to the thirties and forties, when a spirit of spy mania ruled, but even compared to the sixties and seventies. The state's living standard, defense potential, and prestige now no longer depend on protecting information but only on developing science, technology, education, and information technology. It is excessive secrecy that is delaying their development.

In addition to this unseen but expensive payment for secrecy, there is another, by no means symbolic, form of payment. Has anyone calculated how many watchmen, guards, and servants of first departments there are in our country? God grant that they are less than 2 percent of the entire able-bodied population. Of course, enterprises from which material valuables can be taken need to be guarded. But raykoms, ispolkoms, institutes, or the Academy of Social Sciences, which should work in the people's midst: What are they protecting there? Surely not the departmental snack bars?

I remember during a tourist trip in Peru we were taken to the Foreign Ministry. Our tourists were struck above all by the absence of watchmen or guards. The Japanese were once asked why they sometimes place plaster casts at crossroads instead of men on point duty. "We are not so rich as to be able to allow healthy men to stand idle throughout the working day," they answered.

It is not only "little old women with time on their hands" who are employed as guards. A powerful apparatus of healthy men is not sowing, not plowing, not building. They are registering and checking passes in institutions, border zones, and enterprises. In an institute the deputy director for regulations often receives a higher salary than a professor or doctor of sciences, or even than the director himself. Yet he does not design missiles or radar equipment, he merely observes instructions which are written and approved by others.

Playing at secrecy is a malignant sore that has developed from the normal cells of the protection of what are really state secrets to what has now become a veritable calamity for science. It prevents the exchange of information between scientists both inside and outside the country. One more price levied by this phenomenon is the unjustified duplication of work, the loss of scientists' time on formal procedures, the obstacles on the path of the emergence of new ideas, and the delayed development of science.

The French saying has it that the number of plotters is in direct proportion to the number of members of the secret police. I fear that the number of instructions and bans on publications in our country is in direct proportion to the number of those who "enjoy banning." At any rate the procedure for publishing a scientific work is surprisingly reminiscent of the children's game of "don't say yes or no." To obtain a certificate of expert examination authorizing publication, the author, together with a five-man commission, must provide a written oath that the article contains nothing new, original, and interesting, and that it does not use uncompleted scientific work (as though it is possible to definitively complete scientific work).

In accordance with the rules of this game, the oath is ritually registered with a large number of stamped papers. Erasures and corrections are not allowed in them, as is the case in the Gosbank. As a result, the labor input involved in registering the accompanying documents is often substantially in excess of the labor input in writing the article. That is why authors often prefer to renounce the exchange of information with their colleagues rather than engage in this pointless work.

Indeed, if an article really does meet the "does not contain" description accorded it in the certificate of expert examination, there is simply no point in publishing it. Because of this, all scientific and technical journals would simply have to be closed down. But an editor with any skill is concerned only with the act's observance of the formal signs: the presence of seals and the number of pages. On finding an error, a well intentioned editor turns pale while an ill-intentioned editor rubs his hands, eager for blood. But in both cases the article... is returned to the author.

The costs of this game are not that innocuous: According to my assessments, the enormous expenditure of time reduces scientists' labor productivity at least 4-7 percent.

The prestige of Soviet scientific publications abroad is declining steadily. Also humiliating is the actual procedure whereby scientists must justify themselves to laymen like people who are virtually being suspected of espionage.

I think that it is high time that the scientist himself was given the definitive right to determine the possibility of publishing his work. Ultimately he himself is vitally interested in its legal protection as an invention. And who better than the scientist himself to assess the possibility of his work being used in defense technology?

So who needs all this? Bureaucrats employed in secrecy know how to prove the need for their existence "by state interests." The number of secrets grows from one instruction to the next, including through the classification of information known to the whole world.

It is not only the high wages and clean work which attract people to the secrecy service. After all, in this sphere it is not only the secrets themselves but also the ritual of their registration and the activity of the apparatus which, thanks to this fact, is to a considerable extent unsupervised and unpunished, which is concealed from people's eyes. There is considerable power in it. For instance, in our institute even a doctor of technical sciences engages with enthusiasm in registering certificates of expert examination, driving many venerable scientific employees like small boys. Although everyone knows what kind of a "doctor" he is, he keeps the entire institute in fear.

Of course, this apparatus, which has power although it is of little use, does not contain only idlers, talentless people, and failed research workers. It also has intelligent people. So let's think: What are we spending their efforts and working time on?

These questions await answers. Secrecy is the reverse side of glasnost. We cannot develop glasnost without reducing secrecy and the bureaucratic apparatus that stands guard over it. We must learn to look at life with our eyes open and to speak openly about everything.

Soviet Scientists Study 'Computer Virus' Problem *18140089 Moscow PRAVDA in Russian 12 Nov 88 p 6*

[Article by K. Levitin: "End of the 'Plague'? Soviet Scientists Seek Antidote to Unusual Electronic Disease"; first paragraph is PRAVDA introduction. Passages in boldface as published]

[Text] At the start of my journalism career, I was fortunate enough to interview Norbert Wiener himself, the father of cybernetics, as he was then called. "Man is giving cybernetic machines the ability to create, and is thus creating a powerful assistant for himself," he said. "However, a danger also hides here, which may arise in the not too distant future."

Wiener was troubled by our inability to express our desires to the machine in a clear and efficient form. It had not occurred to him at that time that programs created through tremendous labor which possess this clarity, efficiency and simplicity would become a target for conscious annihilation—computer terrorism. At the same time, even he scarcely realized how “computer-dependent” human society would become after only a few decades.

One of the first alarming cases involved an epidemic that affected personal computers belonging to hundreds of thousands of Americans. It was discovered that a “virus” had been brought from the city of Lahore, Pakistan, more precisely from a small computer software store owned by the Alvi brothers—26-year old Amdzhad Faruk and 19-year old Basit Faruk. They sold diskettes containing game programs for amazingly low prices. Naturally, tourists, tempted by this, purchased them by the thousands and gave them to friends and acquaintances, not knowing that they were thus spreading the “virus,” which made the computer memory into something like electronic confetti. Later, the Alvi brothers admitted that they wanted to “punish the Americans.”

Later, in September 1988, a 40-year old resident of the United States, Donald Jean Bursleson, a former programmer at a company, consciously infected the company's computers in order to take revenge for some sort of injustice committed, in his viewpoint, by the company. Furthermore, the number of such cases has multiplied like an avalanche. One after another, computers performing the most important work have gone out of order. Even in the U.S. military, computers stopped or sharply slowed down operation, since their memories had been clogged with meaningless newcomer-programs. Here as well, a young programmer, who had almost become the cause of a nation-wide disaster, was discovered fairly rapidly.

Programs are a very special kind of product which incorporate enormous intellectual power. At the same time, the development of computer ethics lags far behind the headlong growth of computer literacy. This phenomenon has become international. In his day, Academician A. Yershov, now chairman of the USSR Academy of Sciences “Cybernetics” Scientific Council, one of the world's greatest programming theoreticians, explained how much a single mistake in a computer program could cost.

“A certain programmer at the Volga Automobile Plant, giving himself to all sorts of grievances regarding the under-estimation of his work, amused himself with a consciousness of his power over the course of the production process,” he said. “Knowing well the program which controls the main production line, this programmer discovered that it would suffice to change the status of only one cell in the computer memory, and the program would begin to behave first normally, and then entirely senselessly. At some moment, he became a slave to his own idea—it gave him no peace. The thought of the possibility

of declaring his own existence so loudly and persuasively would not leave him. One day, the the unfortunate implemented his idea, indeed crazy. The entire system for feeding parts into the production line broke down. They tried to debug the program somehow, but it was beyond their abilities to find a single unforeseen deviation. In the end, when the circle had closed around him, the programmer confessed to what he had done.”

“What was done with the Herostratos of our time?” I asked.

“He was convicted. Incidentally, this was our first case of such a type. It was discovered that there was no substantial proof of a crime in the case and no equipment breakage had occurred. Nothing had been stolen. Yet, the defendant's actions could hardly have qualified as production hooliganism. However, the point is not the exceptional legal case, but the fact that programs should have unusual reliability and protection—far more than, for instance, a bridge or machine tool. Somehow, we are failing to realize that a collapsed ceiling, the result of an engineering error, is incomparable in terms of consequences to a violation caused by an insufficiently regulated program.

This conversation took place several years ago. At that time no one had even thought of the present-day “computer plague”—an epidemic, like a viral infection, which strikes the computer memory, converting it into a store of meaningless information. However, a great and wise scientist managed to predict this alarming danger. Right now, when reports of the “computer plague” that threatens to paralyze the U.S. economy displace articles on the biggest political battles in the newspapers, Yershov's concerns are already becoming common to all mankind. The fact is that the terrible “virus” has indeed affected not only American, but also our domestic computers, thus confirming an obvious truth: the contemporary world will inevitably become a united whole.

Last summer in Pereslavl-Zalesskiy, an ancient Russian city where one of the youngest academy institutions, the Institute of Software Systems, is located, the now traditional meeting of Soviet and foreign schoolchildren, united by a strong interest in computers, was held. This time, children from the U.S., the FRG, Italy, Bulgaria and Czechoslovakia came to the computer camp. Apparently, entirely by accident, one of the guests brought a “virus” on his diskette into the institute's computer. By the time the computer infection was discovered, it seemed, many programs had already been destroyed, and destruction threatened the rest. After all, the cost of software exceeds that of even the most expensive hardware many times over—a computer without software is just a heap of electronic and mechanical devices.

That which happened next confirmed yet another obvious truth: when researchers follow their own paths and do not repeat that which was done before, they can achieve success even in areas where one or another laboratory, institute or even the country on the whole, to put it lightly, do not lead in world science. Professor A. Aylamazyan, director, USSR Academy of Sciences Institute of Software Systems, doctor of physical and mathematical sciences, told me about the project which enabled them not only to render the computer "virus" harmless and cleanse the institute's computers of it, but also to restore virtually all the programs it had destroyed. In a most general form, this reduces to the fact that the researchers, headed by S. Abramov, head of the laboratory for software systems for parallel architectures,

approached the computer "virus" like an ordinary protein virus. Step by step, as if under a microscope, they traced its criminal activity, tested hypotheses on its structure, on the architecture of its "DNA," and on the "virus's" possible mechanism of action, and then created an antidote—a unique anti-viral program.

Of course, it is still too early to speak as though a universal way to struggle against the "computer plague" has been found. Dreams of "anti-viral" vaccine-programs for computers also remain in the realm of science fiction. However, the first step has been taken. Not only has one specific "virus" been dealt with successfully, but a path for the struggle against all of them has been outlined.

Improving Effectiveness of Military Inventors, Innovators

18140108b Moscow KRASNAYA ZVEZDA in Russian
17 Nov 88 pp 1, 2

[Interview with Army General Vitaliy Mikhaylovich Shabanov, USSR deputy minister of defense for armaments, by Lieutenant Colonel V. Baberdin: "The Horizons of Technical Creativity. How to Increase the Effectiveness of the Research of Army Inventors and Efficiency Experts"; date and place not indicated; first two paragraphs are KRASNAYA ZVEZDA introduction]

[Text] Not that long ago the 1st All-Army Conference of Inventors and Efficiency Experts completed its work. In the troops they waited for it impatiently—here it is, a real reason to interpret and critically evaluate the state of affairs and to outline the directions of the further development of innovation. More than 700 participants—the best innovators and organizers of technical creativity of all the branches of the Armed Forces, districts, groups of forces, fleets, combat arms, and main and central directorates of the Ministry of Defense—gathered at the conference. There was a serious, constructive discussion on how to get out of the rut and to increase the return.

The editorial board asked Army General V. Shabanov, USSR deputy minister of defense for armaments, about his impressions from the work of the first forum of army and fleet innovators and about the means of restructuring technical creativity in the Armed Forces.

[Question] Is not the role of innovators decreasing today, at the time of the ever quickening pace of scientific and technical progress?

[V. M. Shabanov] Even on the contrary, it is increasing immeasurably. Judge for yourself—there is no such sector of the national economy, which the inquisitive thought of scientists, designers, engineers, technicians, and leading workers has not affected. The economic effectiveness from the use of the achievements of the creators of advanced equipment and technology is estimated in the billions of rubles a year.

The idea of Lenin—without advanced science and technology it is impossible to build an army—is well known. That is, without equipment, which is constantly improved and developed. Hence, too, the role of army and fleet innovators.

[Question] Vitaliy Mikhaylovich, letters, in which readers propose interesting technical innovations, are arriving at the editorial office. For troop practice they would be extremely useful, but their authors cannot find understanding in "the appropriate instances." How much time, efforts, and creative energy are being spent on endless "roads of sorrows." You read such letters and feel keenly: not everything is all right with the organization of technical creativity in the troops.

[V. M. Shabanov] Yes, we often take refuge in general numerical indicators. You analyze them, and everything seems normal: the effectiveness and technical level of the found innovative solutions are rising, the quality of efficiency proposals and inventions is increasing. However, this is just the general impression—in real life far from everything is that smooth.

The orientation toward the qualitative parameters of armaments and military equipment dictates the necessity of the most complete use of the achievements of science and technology, the search for nontraditional means of the development of means of warfare, and the use of bold technical solutions. Radical steps on the increase of the reliability and technological operating qualities of armaments and on the automation and mechanization of the labor of vehicle crews, combat crews, and maintenance personnel are needed. The sharp increase of the level of combat training, the intensification of the training process, the improvement and development of the training and material base, and the efficient and economical consumption of material resources are required. The accomplishment of these tasks is impossible without the fruitful work of inventors and efficiency experts.

But now they are operating as if by themselves. For the most part only general indicators, which are not always adequately backed by specific thematic assignments, are incorporated in the plan. The fact that technical creativity in the troops is prone to work in spurts, cannot but be disturbing: it reaches its peak, as a rule, before various kinds of checks and the drawing up of reports.

A very unpleasant statistic is that only one-fifth of the inventions are introduced in practice. About what kind of scientific and technical progress can one speak here? Army and fleet innovators are a very enormous potential, which all of us, leaders of various ranks, must learn to us. For the present a lack of understanding of the importance of the initiative and creativity of army innovators is being observed at all levels of the administrative staff.

Perhaps we have in the regiment and in the division few officers and engineers not only by degree, but also by calling. However, do we not stifle at times in the troops the very idea, the very atmosphere of technical creativity? But it, this creativity, is of not only technical, but also exceptional social importance, especially for young people.

In short, this is a state affair and in the Armed Forces not only ranking officers for the technical area, but also commanders and political workers should deal in earnest with it.

[Question] The social significance of technical creativity is obvious. But all the same effectiveness—combat, economic, technical—should be in the forefront in the

evaluation of the activity of innovators. Do you believe in their ability to compete with design bureaus, scientific research institutes, and plant technological divisions?

[V. M. Shabanov] Of course, they can compete. And not only can they, but they have also been competing for a long time. Clear evidence of this is the exhibits of the exhibition, which was set up during the period of work of the conference. I will note: today practically all the training range equipment, which is being used for the training of troops, was developed in its most important features and principles precisely by military inventors and efficiency experts.

Of course, it is necessary to differentiate tasks. For example, in the troops we will not be able to develop armaments, but it is entirely within our power to improve them and to find means of efficient use, the assurance of reliability, and the improvement of the quality of maintenance and repair. Here one should not count on any major inventions. The main direction in the troops is efficiency promotion. Moreover, it is necessary to take a broad view. Not only military equipment and armaments, but, say, technical means of propaganda and agitation, questions of the improvement of technological equipment, and technical questions of the improvement of medical service should be in the field of view of innovators.

But we also have "large-scale science"—this is our institutes, academies, and schools. There we have the right to expect major discoveries, which are in fundamentally new directions, and inventions, which could change radically one type or another of armaments and military equipment. Unfortunately, that is not happening. Formally everything seems splendid. But all this, if you take a serious look, is of one-time, not mass application and at times is simply the skillful use of practical knowledge in the drawing up of the formula of an invention.

We must first of all direct attention to the creative potential of precisely our scientific organizations. Now novelty is needed literally everywhere. Every military scientist should set himself a supergoal and boldly make for it.

[Question] But, Vitaliy Mikhaylovich, we far from always use fully even what we do have. The following incident comes to mind. The instrument for firing from small arms in the mountains, which was designed by Captain A. Bukharov, deputy commander of a training company, received a high rating both during firing in the district and at the exhibition during the days of work of the conference, but.... And only owing to the note, which the innovator delivered to the presidium on the last day and hour of work of the conference and addressed personally to you, did the fate of the instrument to some degree become clear. As did, incidentally, the fate of the fire-fighting tank, the design of which was also presented at the exhibition.

[V. M. Shabanov] Here you are entirely correct. The introduction of new developments is in general a weak spot in our country, and in the Armed Forces in particular. We have set ourselves a priority task—to instill in people a belief in the necessity of their labor. How is this to be done? By the extensive introduction of the best developments. Let this first be the exhibits of the exhibition, which was held during the days of the conference.

But this is just the first step. Further it is necessary to establish an efficient information system and an adjusted system of the selection of technical innovations for introduction in practice at various levels—for example, for the units and subunits on the scale of the district, on the scale of the arm and branch of the Armed Forces. An important task is to find a permanent production base, to aim repair plants and workshops in some way at this, and to bind them economically to output of this sort.

At times the ambitiousness of individual designers and our imperfect economic relations with industry, not to mention organizational absurdities, interfere. All this as if does not let our military innovators into the zone of action of industry. It is necessary to combat this.

For the present we also do not yet have a clear procedure of supplying information. Life suggests that a centralized information organ is necessary. This question must be studied.

[Question] The conference participants in their statements often touched upon the problem of patent support. I would like to hear your comments on these questions.

[V. M. Shabanov] Thorough comprehensive patent studies are a guarantee that a job is performed at a high level and has novelty. It is senseless to invent what has already been invented and to spend time, effort, and assets on this.

An alarming figure is the fact that annually on the average with respect to nearly 40 percent of the applications for inventions inventor's certificates are not issued mainly due to the lack of novelty in them. The percentage of rejections is high, particularly at a number of institutions and organization of the Rocket Forces, the Navy, and the directorate of the chief of engineer troops and the chief of signal service of the Armed Forces.

The fact that in practice there are no permanent patent subdivisions at scientific research institutions, planning and design organizations, and military educational institutions, while in the Ministry of Defense there is no unified patent collection, is adversely affecting the state of affairs.

The views that the time and even the need have arrived to introduce at academies and schools a course on the fundamentals of invention and patent affairs, were

voiced at the conference. I am also convinced of this. It is impossible to imagine an engineer as the bearer of high technical standards, if he has not taken patent literature in his hands and does not know how to make a patent search, how to draw up an application for an invention, and where to send it for evaluation.

I cannot agree with those who are convinced that ostensibly the patent evaluation of applications for an invention should be made exclusively at extradepartmental institutions. In my opinion, this is a manifestation of bureaucratic thinking. We have recognized institutes, at which acknowledged specialists work.

There should, of course, be extradepartmental evaluation. An arbitrator is necessary, but this should be an exception, not the rule. In especially conflicting situations we should set up competent commissions within the Ministry of Defense. And we do have such a practice.

True, far from everything is also smooth in this matter—the obvious decrease of the quality of the evaluation of applications for inventions is being observed. Specialists of the main and central directorates have begun to accept for evaluation proposals that are aimed at the solution of general technical, often minor, special problems, and not at the accomplishment of tasks which are connected with the development of qualitatively new specified types of armaments. The patent materials, which are in the administrations and collections of the State Committee for Inventions and Discoveries, in practice are not being studied, the novelty, utility, and scientific and technical level of proposed innovations are being analyzed incompletely, and the drafts of the decisions, which are being prepared with respect to applications, are not always of high quality. The very examination of applications is being dragged out for long years. It is necessary to work with experts, and to do so constantly.

[Question] Now it is not customary to discuss questions that are connected with the revision of the organizational staff structure. However, what if we make an exception? In April 1942, during the most difficult time for the country and the army, Order No 107 of the People's Commissariat of Defense, in conformity with which the staffs of organizers of invention work in the central and main directorates were increased by nearly twofold, was issued. At the conference during the work of the sections the question of the revision of the staff structure was repeatedly raised.

[V. M. Shabanov] I would not frame the question that way. If we speak as a whole, the organizational staff structure of the organizers of technical creativity, in my opinion, is rather good. Of course, it is necessary to adjust some things and to strengthen specific units. This we will do. But the essence of restructuring does not lie in this. My efforts are on behalf of another thing. You think that in our country invention and efficiency promotion will improve drastically, if we strengthening the staff,

which is quite developed as it is. Well, this conveyor will operate with high revolutions—it will put out more procedural recommendations, instructions, directives....

I assure you, new vacancies will appear and there will be more than enough people who wish to hold them. The work, all the same, is a little more peaceful than in the troops, and the responsibility cannot be compared. But it is necessary that this place would be not peaceful, but as in a volcano. One must not bureaucratize invention. On the contrary, it is necessary to simplify reporting and to aim all the work of the organizers of technical creativity at the search for talented people and bold solutions. To find them in the common mass and to bring these solutions up to extensive introduction.

Special people, whom they should know in the troops, should supervise the organizing work on invention—they come to them, share ideas, seek advice, and count on their assistance. And we have such people. Lieutenant Colonel I. Tkachenko came to the Group of Soviet Forces in Germany, turned everything over there in his own way, and raised the alarm. And things got moving.

Colonel (Retired) A. Yezhov is an old resident of the Military Engineering Institute imeni A.F. Mozhayskiy, a talented propagandist, and an organizer of invention. In many respect it is also his service that the institute is truly a school of technical innovation. A school, to which cadets have been extensively attracted. Judge for yourself—for several years in a row first prize for participation in the review of student and cadet design bureaus has been awarded to the institute. Last year alone here cadets received 80 author's certificates for inventions and submitted about 300 efficiency proposals on the improvement of the educational material base, more than 600 proposals were submitted by cadets during the period of the performance of practical work and practical studies. This experience is valuable, and it is necessary to disseminate it.

Summarizing the discussion, I want to say that restructuring in the organization of technical creativity is now objectively necessary—the new conditions, under which the army and the fleet are today, dictate it. This found reflection in the appeal to the personnel of the Armed Forces, which was adopted by the conference participants. Indeed, we have an important step ahead—we have to draft a large number of legal documents in connection with the forthcoming appearance of the Law on Invention Activity in the USSR. Changes are approaching, and it is necessary to be ready for them. We have taken just the first steps, it is already impossible to stop on the way.

Military Construction Suffers From Lack of Innovation

18140108a Moscow KRASNAYA ZVEZDA in Russian
3 Sep 88 p 2

[Article by Captain Lieutenant A. Loskutov (the Black Sea Fleet): "The Potential Exists. What Is the Return? Reflections Before the All-Army Conference of Inventors and Efficiency Experts"]

[Text] The efficiency experts of the Construction Directorate of the fleet during the past year introduced 615

innovations, the economic impact exceeded 1 million rubles. It would seem that everything is in order; but, as G. Tolpegin, chairman of the organization of the All-Union Society of Inventors and Efficiency Experts, testifies, these "indicators could have been much higher, had all military construction personnel taken part in technical creativity." What is meant here?

If we turn to more specific figures, it turns out that in the past 2 years not one (!) efficiency proposal was received by the commission for invention from military construction detachments.

I foresee bewilderment, but you will not escape the fact.

Let us ask ourselves a question: What is the source of inspiration and the stimulus of creative thinking of innovators? First of all, most likely, a not indifferent attitude of a person toward his job, a love for the chosen occupation, and even, I dare say, dissatisfaction with what has been achieved, the aspiration to improve the form and methods of his work, and the desire to make it more efficient, productive, and interesting.

In development of this thought I want to cite the opinions of Lieutenant Colonel (Reserve) E. Belous, senior engineer of the production engineering division of one of the construction organizations. "Every person," he believes, "in his essence is a potential efficiency expert. While working, he cannot but think about how to facilitate the conditions of his labor and to make it efficient and economically more profitable. But whether or not his reflections will take the shape of specific efficiency proposals, depends on certain conditions."

Eduard Frantsevich himself is by right regarded as one of the most active efficiency experts of the fleet. In 30 years of work at construction projects he has developed and introduced more than 300 innovations. He has helped his colleagues and subordinates to introduce just as many more. The creative thinking of the innovator is also not losing its poignancy today.

Not that long ago, for example, the construction organization, at which Belous works, was commissioned to repair the supports of the walls of specialized facilities. The designers proposed to use for this purpose concrete metal-reinforced blocks. However, experience and the results of intense creative research suggested to Belous another solution. He calculated, demonstrated, and got through. As a result, in the repair of just 1 facility 140 tons of metal components and 1,000 cubic meters of concrete were saved, the economic impact came to more than 36,000 rubles.

It would seem that everything is correct, everything is logical and natural for the experienced specialist. Only this "got through" clouds the picture. But what is he had not gotten through? Does the creative impulse not fade because of this?

It is also possible to hear the following about the stimuli of creative activity: "I cannot watch calmly when valuable construction materials are wasted, when people work in vain and unproductively and perform, as they say, 'stupid' work." Once I had occasion to be a witness to this following conversation between construction superintendents:

"Ivanych," one of them addressed his colleague, "lend me the bulldozer for half an hour to level the ground."

"The bulldozer is not here," the latter said curtly, "it is busy."

"Well, then give me five soldiers with shovels, you have free people."

Incidentally, here neither the essence nor the content of the conversation surprised any of the people present. At fleet construction projects they have become accustomed to such equivalents. This following pun has become customary: "Two soldiers from a construction battalion replace an excavator." And unconcealed irony with respect to the routine in construction work and the poor mechanization of labor-consuming jobs can be detected in it.

Of course, efficiency experts alone cannot solve the problem of mechanization in construction, and still our conversation is about them.

"If I am to be frank," Georgiy Nikolayevich Tolpegin reasons in this regard, "it is difficult to expect high creative activity from military construction personnel. Not all of them have a high level of vocational training, many know Russian poorly and often are employed in secondary jobs. There are also other reasons."

These assertions are not without grounds. It is difficult for a soldier and even a sergeant to compete in technical creativity with an engineer or construction superintendent. And still it is impossible to regard what has been named as indisputable. First, it simply does not apply to such a category of personnel as officers and warrant officers. Here both education and an interest in service are present. And creative thought did not fade under the soldier's field service cap. After all, for example, military construction personnel F. Namazov, N. Yulchiyev, and M. Sultangeldyyev were able to develop and introduce a simple, but quite efficient device for the removal from the hopper of a concrete mixer of the remaining slurry; Junior Sergeant N. Pyzhov also has technical improvements to his credit. In short, if you look more closely, at fleet construction projects it is possible to find many different useful improvements, which military construction personnel have made in production technology.

How is one, all the same, to explain the paradox that in military construction detachments, the well-being of which depends on each kopeck earned by a soldier, they reject with such ease the obvious advantage of efficiency

promotion work? The fact that in military construction subunits many innovations are in the position of "illegitimate children" and they often "forget" even to officially register them, not to mention the incentive for innovators, can hardly stimulate the movement of innovators.

It seems that it is time to return to the words of Lieutenant Colonel E. Belous concerning the fact that much "depends on certain conditions." What are these conditions? It turns out that the obvious advantage from efficiency promotion work, it would seem, is economically unprofitable for military construction detachments. Whether or not, for example, Junior Sergeant N. Pyzhov introduced his technical innovation, registered it legally, or cast it to the mercy of fate, the subunit does not obtain a kopeck from this. And even on the contrary, it bears certain losses. For only the deductions from the wage of the military construction worker go into the fund of the detachment. The economic impact from the proposal, which was introduced by him, falls to the enterprise or construction and installation section, where the soldier or sergeant works.

Time and expenditures of manpower resources, which, as a rule, turns for the detachment into losses of man-hours, which were worked at the works, and, naturally, rubles and kopecks of the wage, are required for the development and introduction of even the simplest technical innovation. The logic here is simply. Will the command of the detachment agree to a matter that is obviously unprofitable for itself? No, of course. Remembering that the senior commanders once in a while will remind commanders of the indicators in efficiency promotion work, they openly do not hinder innovators, but also do not give any support.

How is one to get out of this contradiction? Some specialists propose to distribute the economic profit from efficiency proposals uniformly between military construction detachments and construction enterprises. Others advocate the quickest changeover of military construction detachments to full cost accounting and self-support [samookupayemost]. Still others are convinced that the solution of the problem lies in the punctual fulfillment of

the requirements of the documents that regulate efficiency promotion work. There is supposed to be, say, in the organization and at the enterprise, where a specific number of specialists work, a free secretary of the commission for inventing work, but there is not. Due to this many valuable proposals and ideas just remain paper wishes. People at times even do not know where to turn with them. It also happens as follows—there is a person, who is responsible for the organization of technical creativity, but they burden him with such additional loads that he really does not have time for innovators. Such a thing is encountered not only in construction subunits, but also in combat units and on ships.

Incidentally, they are well aware of all this in the Department of Invention of the Ministry of Defense.

But it must also be admitted that many documents, which are connected with the organization of technical creativity, have become obsolete, there are no clear legal norms here. What, say, is the status of inventors at a works? What are their interrelations? Why is the enterprise or unit, in which the innovation originated, not in a hurry either with its introduction or with the transfer of the documentation to related subunits? The point is that the enterprise is not the owner of the innovation and does not have any rights to it as a legal entity.

And another thing. Any work goes well, if competent people supervise it. In the organization of technical creativity many serious shortcomings have accumulated. These are the supply of expendable materials and parts, material stimulation, and, what is the primary thing, an interested attitude and assistance in the introduction of innovations. Such a very negative and abnormal phenomenon as questionable joint authorship also exists. There are many problems. Without solving them, we lose much.

The All-Army Conference of Inventors and Efficiency Experts will be held in October. I believe that a concerned discussion will take place at it. All the problems will not be named, but the main thing, it seems, is to remove quickly the "bureaucratic glasses," through which we view efficiency promotion work, and to look at it with a critical practical eye.

USSR-Italy Cooperation in Science & Technology
18140099 Moscow TASS in English
1232 GMT 9 Dec 88

[Text] Moscow, 9 December (TASS). The results of scientific and technical cooperation between the USSR and Italy over 1988 and prospects for its future development have been examined at the fifth session of the mixed Soviet-Italian commission held here today. The USSR delegation was headed by Ivan Bortnik, First Deputy Chairman of the State Committee for Science and Technology and the Italian delegation by Gilberto Bonalumi, Deputy Minister of Foreign Affairs. The sides also endorsed a programme for scientific and technical cooperation for 1989-1998.

Commenting on the results of the session Ivan Bortnik told a TASS correspondent that the resumption of the commission's work after a break of almost ten years had created qualitatively new conditions for the development of Soviet-Italian links in science and technology. Thus bilateral cooperation has been stepped up vigorously in the sphere of medicine and health care, space and ocean research, the peaceful use of atomic energy

and environmental protection. The links between scientific organizations of the two countries in the fundamental sciences have been expanded. And nonetheless, he noted, the level of scientific contacts as they stand today obviously does not correspond to the potential opportunities between the two countries.

As for the cooperation programme it determines promising directions for bilateral links: joint projects in the sphere of biotechnology, information science, superconductivity, atomic power engineering, and the creation of new materials. They create the opportunity for significantly raising the level of cooperation.

Taking into account the importance of the protection of industrial property for the development of scientific and technical cooperation between the USSR and Italy, the head of the Soviet delegation said, the commission took a decision to resume in the very near future the activities of the relevant working group. It will concentrate its efforts on completing the draft agreement in this sphere.

The next session of the commission will be held in Italy in 1990.

Armenian Gosplan Official on Republic S&T Progress

18140086a Yerevan *KOMMUNIST* in Russian
25 Nov 88 p 2

[Article by A. Agababov, chief, ArSSR Gosplan Department of Science and Technology, under the rubric "After the Line of the Armenian Communist Party Central Committee Plenum Resolutions:" "Science and Restructuring." Passages in boldface as published]

[Text] Science is one of the outposts for transforming our society. It is hard to overestimate its role in restructuring. Armenian scientists are definitely contributing to the implementation of Union-republic programs. In accordance with the tasks of the state-wide scientific and technical programs for the current 5-year period, the following development work, in particular, will be accomplished: output of laser elements will be mastered in experimental industrial production ("Lazernaya Tekhnika" NPO [Scientific Production Association] and the Institute for Physical Research); new processes for producing small-tonnage chemical products will be applied (the ArSSR Academy of Sciences institutes of microbiology, organic chemistry and biochemistry), an integrated system for protecting basic agricultural crops from pests, diseases and weeds under conditions of intensive cultivation technologies have been introduced (Armenian NII [Scientific Research Institute] For the Protection of Plants), and other projects.

This list could continue, but let us speak of the shortcomings, of that which has not yet been realized. Along with the work that was accomplished, significant changes in scientific and technical progress have not occurred.

There are serious shortcomings in developing and implementing republic scientific and technical programs. Thus, the program for "Development and Creation of Experimental Electrified Technologically Closed Animal Husbandry Complex" was included in the plan for the 12th 5-year period on the suggestion of the ArSSR Academy of Sciences. However, as a result of the reorganization of the Ground-Space and Seismic Forecasting Systems SKB [Special Design Bureau], this head organization essentially **dodged** the indicated work.

From 1985-1987, the Yerevan Polytechnical Institute imeni K. Marx **did not ensure** the implementation of both the Armenian Communist Party Central Committee and ArSSR Council of Ministers Resolution on Scientific and Technical Progress, as well as of the republic Council of Ministers decrees regarding the development of the republic scientific and technical program for the "Development and Application of Progressive Ways and Means to Use Industrial Wastes." This area has now been entrusted to the Armenian branch of NIIPiN under USSR Gosplan, where **no significant shifts are being observed.**

The program for preserving the surrounding environment in the ArSSR is not finding proper scientific substantiation and a comprehensive solution. It was **not established** in the 3rd year of the 12th 5-year period (the ArSSR Academy of Sciences Institute of Geological Sciences is the head organization, and ArSSR Goskompirod is responsible for developing and implementing the program). During the last years of the current 5-year period, the ArSSR Academy of Sciences, Minvuz and other republic ministries and departments **have made virtually no proposals** for applying new equipment and technologies in the economy which meet present-day requirements, i.e., which revolutionize social production.

Indisputably, creating a production and experimental base for scientific institutions is of great significance for the development of science. However, what do we have? About 1.5 million rubles have remained unused for these purposes in the past 2 years of the 5-year period, **on the fault of the ArSSR Academy of Sciences** and subcontracting construction organizations.

Such indifference also prevails in training scientific cadres. For example, in the draft plan for 1989 the ArSSR Academy of Sciences stipulated reducing the number of graduate students to be accepted, even in high-priority fields (!).

Except for Minkhimmash and Minstroydormash, the enterprises of the machine-building ministries have not fulfilled the plan for applying new equipment. Thus, the Charentsavan "Armavto" Production Association upset production of the full volume of parts and assemblies conforming to the agreed specifications, as well as the comprehensively mechanized production of castings. The Kirovakan "Avtomatika" Plant is delaying the mastery of a refractometer for ultra-filtration installations that determine levels of product concentration in a solution. A number of machine building enterprises have not paid proper attention to the problem of renovating industrial output, mastered by production more than 10 years ago.

Study of the fulfillment of plans for introducing new equipment over recent years indicates that unsatisfactory organizational work, failure to inform or tardy delivery of assignments to the implementers on the part of the ministries, and a lack of coordination of said assignments with production plans, exist.

Thus, a higher organization, without coordinating with the enterprise's administration, stipulated that the Yerevan Automotive Plant was to introduce five industrial robots. However, the robots were not introduced due to the economic inexpediency of using them at the plant (small workload, repeated re-adjustment, low lifting power and increased number of service personnel). There is also the set of planned work to automate and provide dispatcher control for the Yerevan "Aeratsiya" Station, which was not fulfilled because of a failure to

include the project on itemized construction lists. Minpribor's Yerevan "Elektropribor" Production Association received its new technology assignments late, only in January 1987.

Three industrial robots were not installed at the Yerevan Milling Machine Plant because of it lacked the floor space needed for them. Two robots were not installed at the Leninakan "Strommashina" Plant because the complete set of equipment was lacking, etc. These are serious failures in planning coordination.

Individual enterprises are still forgetting the main requirement of the day—improving production quality! On the whole, the plan for producing output of the highest quality category was fulfilled by 86.7 percent in Minpribor enterprises, by 92.5 percent in Minkhimmash, by 86.3 percent in Minstankoprom, etc.

Along with enterprises of Union subordination, ministries and departments of republic and Union-republic subordination have not fulfilled plans for the economic and social development of the ArSSR in recent years of the 12th 5-year period.

The enterprises and organizations of Gosagroprom, Ministroymaterial, Minlegprom, Minkhleboprodukt, Aykoop, Ministroy, Minavtodor, the Yerevan City Soviet Executive Committee, and others, have permitted a significant lag.

It is intolerable that the leaders of a number of enterprises and organizations, at the same time that they have been granted extensive rights and opportunities under the new conditions of economic management and under the effect of the Law on the State Enterprise, are scorning the problems of applying the achievements of science and technology. After all, this is needed in order to raise the technical level of production and the quality of the products being produced.

The serious shortcomings made in fulfilling the plans for new technology and, on the whole, for solving the problems of accelerating scientific and technical progress in sectors of the economy, can be explained to a considerable extent by the fact that most of the republic's ministries and departments do not fully perform their function as the sectorial headquarters for technical progress. They lack a comprehensive system for planning and managing this process.

Underestimating the problems of raising the technical level of production has led to the fact that, strange though it may seem, the corresponding subdivisions in the central apparatuses of individual ministries and departments have been eliminated or do not exist. Thus, in 1988, the technical department in the Minsvyaz apparatus was eliminated, while only one associate works on this at Minvodkhoz, and the Yerevan City Soviet Executive Committee has no corresponding subdivision at all.

The recent 19th All-Union CPSU Conference emphasized the important significance of intensively developing the basic and applied sciences, and simultaneously pointed out the need to develop new ways to organize scientific life.

Therefore, scientific institutions of an economic nature, jointly with the organizations involved, are faced with developing and, in the established procedure, approving a system for managing and planning scientific and technical progress in the republic, taking into account the increasing rights of local economic administration authorities.

The problem of accelerating scientific and technical progress requires coordinated plans for the development of scientific and technical programs, regardless of the departmental subordination of scientific and design institutions, associations, enterprises and other organizations.

We believe that the problem of the revolutionary restructuring of science and technology in the republic can be solved primarily by radically restructuring the work of the ArSSR Academy of Sciences.

The ArSSR Academy of Sciences and its scientific institutions should actively participate in solving republic scientific and technical programs and should provide scientific leadership for them. The work of the numerous, basically inactive coordination councils under the ArSSR Academy of Sciences Presidium must be critically evaluated and, in their place, coordination councils for republic scientific and technical programs must be organized. In this regard, they should be given definite responsibilities and granted the corresponding rights.

In our opinion, we need to create a department of technical sciences in the ArSSR Academy of Sciences system. It is time to review the rules and structure of the ArSSR Academy of Sciences Presidium apparatus.

Ministry and department leaders must radically restructure their work. They should be made responsible for fully implementing the function of the headquarters of scientific and technical progress for the sector.

The leaders of ministries and departments should also extensively employ economic methods, levers and incentives which ensure industry's receptivity to the latest achievements of science and technology under the conditions of the increasing independence of associations, enterprises and organizations.

Obviously, the supply of highly skilled scientific, engineering and technical cadres is a main problem of the revolutionary restructuring of science and technology.

Serious shortcomings in this work continue to occur in the republic. Thus, a tendency to reduce the total number of graduate students, particularly in high-priority fields of science, is being observed in training scientific

cadres by way of graduate study. The timely defense of dissertations is not being ensured, and so on. Everyone knows of the shortcomings in the qualitative training of engineering and technical cadres in the republic.

I am sure that the ArSSR Academy of Sciences and other ministries and departments will take effective steps to improve the training of scientific, engineering and technical cadres.

Today, the problem of the revolutionary restructuring of scientific development in the republic requires the taking of effective organizational measures based on the further democratization of science, as stipulated by the 19th All-Union CPSU Conference resolution.

History, Perspectives of Latvian Science Outlined
18140086b Riga SOVETSKAYA LATVIYA in Russian
29 Nov 88 pp 3, 4

[Article by Ya. Stradyn, LaSSR Academy of Sciences academician: "Science and Society In Latvia"]

[Text] I will begin with the words of Louis Pasteur: "Science has no homeland, but the scientist does."

Science has many aspects—knowledge of the world, the transformation and improvement of life, and the creation of common cultural values. Science is united and international, but right now it is necessary to emphasize and, perhaps, even to exaggerate precisely this latter feature of science. This corresponds to the motto of our constituent congress and the future Union of Sciences, "Scientiae et patriae" ("For science and homeland"), which previously was also the motto of the Latvian University. This aspect is particularly topical today, since we are meeting in Latvia, in Riga, at the end of 1988, a year of revolutionary transformations, soon after the 19th All-Union Party Conference, at the apogee of the third Latvian rebirth. The Union of Scientists which we are creating today will not be a society of chemists of physicists, nor a society of biologists and philosophers—such societies already exist and are working and have worked successfully in the past in Latvia. Our union will not even be a coordinator for individual sectors of science: it should be a union of socially active scientists, it should unite not only the discontented, but also those who wish, can and want to work actively. The "science and society" problem, namely, what science can give society and conversely, what society can give science, should be central.

Meanwhile, there is no organization similar to ours in the USSR, but there is the Universal Federation of Scientific Workers, the Paguoshskiy Movement and the Roman Club. The Baltic area is now the vanguard of restructuring in the Soviet Union and it should be noted that the processes taking place here, although they sometimes seem regional and national, are inseparable from the overall processes of restructuring in our country.

If we look at the history of the Latvian people, we see that here social thinking was formed by publicists, writers, poets, journalists and professional politicians: K. Valdemar, K. Baron, P. Stuchka, Ya. Yansons-Brauns, F. Rozinsh-Azis, K. Ulmanis, Ya. Raynis and, right now, for example, Ya. Peters. Scientists have usually kept somewhat to the background and their voices were not too loud. It could possibly be said that this is the specific nature of science, but nonetheless I would like to recall D.I. Mendeleyev, V.I. Vernadskiy, K.A. Timiryazev, the Vavilov brothers and, in recent times, Academician A.D. Sakharov (who, unfortunately, was unable to comply with our invitation and attend our congress, but whom we are electing first honorary member of our union). They formed social thinking in Russia. I would also like to recall A. Einstein, B. Russel, Wilhelm Ostwald (in the twilight of his life), and J. Bernal, who have developed the "new thinking" in the world.

Have there been socially active scientists in Latvian history, scientists who would not have limited themselves to the frameworks of their own narrow field in their activity? The history of Latvian science has at least 2 centuries of tradition, beginning in 1775 with the creation of the Petrov Academy in Yelgava. Treasures were created here in the past, who have remained in the golden fund of science: Wilhelm Ostwald, the only Nobel Prize winner from the Baltic area to this day, Teodor Grotgus, and Paul Valden, who all created the foundations for physical chemistry. Kh. Pander worked in paleontology. P. Bol conducted important research in mathematics. Fridrikh Tsander, in rocket building and astronautics, and Yan Endzelin, in Baltic linguistics, received extensive fame. We should also remember Aleksandr Lozinskiy's works on balneology. We shall limit ourselves to these names of scientists of different nationalities, not mentioning many researchers born in Latvia who worked outside the homeland. The names of these Latvian scientists, as well as of many others remind (or do not remind) us of the narrow fields of science in which they worked. However, there have also been teachers here for 200 years, people who promoted scientific and technical progress and raised their voices against social and national injustice.

Professor I. Bezeke of the Petrovskiy Academy participated in the revolt of the Yelgava millers, physicist G. Parrot threw his lot in with participants in the peasant disturbances in Kauguri and, together with the first natural scientist, Latvian D.-Kh. Grindel, started the progressive tradition of forming scientific societies and popularizing science. The teachers at the Riga Polytechnical Institute (the first technical university in the Russian empire), founded in 1862, contributed to technical progress in the Baltic area and throughout Russia and helped make Riga a modern European city.

For example, Professor M. Glazenapp suggested cultivating sugar-beets in Latvia and proposed supplying Riga with water from Lake Baltezers—there was a time when Riga was second among European capitals, right after Vienna, in terms of drinking water quality.

Paul Valden, a scientist of Latvian origin, unsurpassed in importance to the present day, repeatedly nominated for the Nobel Prize, was in the vanguard of the progressive scientists of Russia during the February and October revolutions, along with V.I. Vernadskiy and K.A. Timiryazev. Valden's outstanding speeches on science and life, inventions and inventors, technical creativity, the depreciation of matter, and the tasks of applied natural sciences resounded most extensively throughout all of Russia at that time and deserve being reread and, perhaps, re-published today. Because of the lack of time, I cannot quote excerpts from Valden's introductory speech, given at the constituent meeting of the Association of Natural Scientists and Doctors at the Bolshoy Theater in Moscow in August 1917, but I ask you to believe that this speech would be appropriate even in our day and has not lost its topicality.

The year 1919, when the Latvian state arose and the Latvian University was founded (essentially twice—as a Soviet higher educational institution in February, and as a higher educational institution in a national republic in September), brought an exceptional upsurge to Latvian science. In both cases, for the first time Latvian scientists, who had previously been discriminated against, obtained access to the university and the Latvian language became the language of the higher school and science. Two viewpoints, the general scientific and the national, clashed: P. Valden and economist Karl Balodis represent the first, and S. Efert-Klusays and P. Stuchka supported it; young Latvian scientists in agriculture and the humanitarian sciences, such as A. Kirkhenshteyn, P. Leinsh, P. Nomals and P. Dale, who supported the Ulmanis temporary government, represented the second. Possibly, the second viewpoint was victorious in an overly categorical form. Because of the activity of the temperamental physicist Frits Gulbis and his incorrect actions, Riga lost its most outstanding scientist, Valden, who never returned to Latvia. Evaluating these phenomena in retrospect, it nonetheless seems like Latvians were unable at that time to deviate from national priorities, since this created a foundation on which Latvian scientists were educated in the course of 20 years and finally made it possible to create the Latvian University at a European level. The successes of the Latvian University are impressive. Possibly, the time of the Latvian republic has really been the “golden age” of the Latvian University. However, we should not look at the past only nostalgically, but also objectively. We should not exaggerate the achievements of that time. As rector and Professor Yu. Aushkaps said, this was nonetheless “a time of poor settlers,” on the edge of Europe, where opportunities for scientific work were limited. At that time many scientists, such as Yuliy Aushkaps, were either far removed from politics or related to national-conservative circles. There were few leftist teachers at the Latvian University. Perhaps this conformed to the spirit of the times? Some even relatively well-known scientists, such as Ye. Vitols and Yu. Plakis, openly preached anti-Semitism.

Speaking of those days, we should remember above all not these people, but Yan Endzelin (his struggle for the Latvian language), Paul Leinsh and his colleagues (their struggle for rational agriculture in Latvia), Avgust Kirkhenshteyn (his struggle for proper nourishment), and Pavel Stradyn (his struggle for the people's physical and spiritual health). I remember his words at the opening of the Society for Health Assistance in 1937, warning of the unfavorable demographic situation observed in Latvia since 1929: “The people's living strength is more important than all of our material prosperity. States have risen and perished, but physically and spiritually healthy peoples, like living organisms, have preserved their language and culture throughout the centuries.” We should remember Bruno Yirgenson and his struggle to popularize the latest scientific achievements in Latvia, and Karl Balodis and his progressive economic ideas, far ahead the times. We should remember Arved Shvab, the Vipers (father and son), F. Balodis, L. Arbuzov, and Ya. Strauberg with their new (questionable, perhaps) approaches to Latvian history.

World War II seriously damaged Latvian science. Many scientists of European nationality perished—Naum Lebedinskiy, Vladimir Mints (who treated V.I. Lenin after an attempt on Lenin's life), and M. Tsentnershver in Warsaw. Yuliy Aushkap, Peteris Stakle, Paul Mints and others were victims of Stalinism. Fearing for their future and a repetition of the Stalinist repressions of 1941, over half of our most outstanding and promising scientists fled Latvia. Many of them continued their scientific careers in the West. However, there were also scientists who stayed with their people during the fateful year of 1944, who did not let the light of science die out in Latvia and passed the scientific traditions from one era to the next. On this basis, the Latvian University and the agricultural academy were restored by the autumn of 1944, and for the first time in Latvian history, Soviet power in 1945-1946 was able to implement the idea of creating a Latvian Academy of Sciences, which had arisen a long time ago. The progressive local scientists, joined by many scientists who arrived from other centers of the Soviet Union, of whom I note Ya. Peyve, L. Lepin and Ya. Zutis, were its nucleus. Let us note the support of the USSR Academy of Sciences—Academicians Ye.N. Pavlovskiy and S.I. Vavilov—in creating the LaSSR Academy of Sciences and its first scientific directions.

I want to emphasize that at that time precisely the scientists, acting very cohesively, were the vanguard of progressive transformations in Soviet Latvia. Remember Paul Leinsh, the first president of the LaSSR Academy of Sciences, who bravely defended the idea of healthy competition among kolkhozes and individual farms. Remember Yan Endzelin, who courageously continued to stand up for the Latvian language and truth in science, as well as Paul Galeniyeks and Peteris Rizga, who defended scientific truth in biology. Remember once again Pavel Stradyn, for whom these years were the apogee of social work not only in medicine, but also in

supporting the high standard of Latvia as part of the Soviet Union. "We will be able to do a great deal, like a kind of model farm. Each such farm, lovingly cultivated, is not only of great practical benefit itself, but also serves as an example for others," which I quote from his speech on Riga's future (1945).

If the scientists' recommendations had been listened to, Riga, Yurmala and Latvia would look different today. We should also remember Academician A. Kirkhenshteyn, a very complex, complicated figure, whose influence on sociopolitical life and science has still not been fully evaluated, just as people's writer A. Upit, one the first members of our Academy of Sciences, has not been evaluated.

However, progressive Latvian scientists were forced most severely to remain silent in 1946-1949. We have written a great deal about the upsurge of science in Soviet Latvia; I have reread that which was written, including that which I myself wrote, and do not renounce it today. However, that which went unspoken must now be said. Stalinism left deep traces in Latvian science as well. Early in the year, I talked to one of our leading scientists, who said approximately the following: "However, my friend, after all, nothing terrible happened in Latvian science, not a single scientist was shot." Yes, true, in Latvia there were no losses, like N. Vavilov and other geneticists, like Chayanov, like the many Russian scientists who were arrested, repressed, and who perished, like our noted countryman, chemist Rudolf Udriš, who died in Dzerzhinsk in 1949. However, purges also occurred among scientists in Latvia in the postwar years. Scientists were arrested or released from work and essentially an entire generation of scientists fell.

The re-education of old bourgeois specialists in the spirit of so-called Bolshevik criticism and self-criticism was proposed. This happened according to the "Chinese scenario"—first a critical article published in the press, then condemnation at meetings, the "studying," and the compulsory confession. Re-education was improper, unjust and humiliating. Thus, Yan Endzelin, Paul Gale-niyek, Avgust Keshan, Artur Tramdakh, Paul Stradyn, Alfred Iyevinsh, Karlis Egle, Peteris Rizga, Yanis Apsitis, Yanis Strauberg and many others, not excluding Avgust Kirkhenshteyn and Paul Leinsh—essentially almost the entire flower of Latvian science—were re-educated. Peyve, Zutis, and Kadek were accused of objectivism and insufficient vigilance. A new genre, that of political denunciation, flourished in science. In the archives, as well as in the periodicals of that time, one can find samples of this genre: last year with the help of historians I gathered impressive, although hardly exhaustive, literature on this subject. I have neither the time, the opportunity, nor the desire to list all the names of the "critics," but it would be unjust not to name Ya. Bumber, LaSSR Academy of Sciences corresponding member. Reports by academicians and corresponding members are preserved in our Academy of Sciences archives. Ya. Endzelin wrote. Ya. Peyve wrote. Ya. Bumber's report for the 5-year period was laconic (2

December 1951): "Essentially, I did no scientific work in the 5-year reporting period, since all my efforts were devoted to defeating the Latvian bourgeois nationalists." He was a universal specialist in economics and biology, as well as in agricultural sciences and in history. He ardently supported Lysenko, criticized Leinsh, Endzelin and Peyve, instituted the proceedings of the notorious "Young Latvians Case," criticized Robert Pelshe for the book "*Druzhba Latyshskogo i Russkogo Narodov*" [Friendship of Latvian and Russian Peoples], and wrote militant articles with the screaming headlines: "Machinations by the Accomplices of Bourgeois Nationalists," "Time to Bring Bolshevik Order into the Agricultural Academy," etc.

These essays have something in common with the article by A. Voss and N. Muravyev, "Decisively Unmasking Cosmopolitanism at the Latvian State University," which threatens Professor Artur Tramdakh, doctor of engineering sciences, "an outright smuggler of bourgeois ideology, a stateless cosmopolitanism," "who teaches bourgeois morals as the only common human morals. Professor Tramdakh's discourses on conscience also reek of moldering cosmopolitanism." In criticizing Tram-dakh's thinking that engineering ethics and esthetics are necessary and his words that "social consciousness, a feeling of responsibility and a feeling of honor should form the foundation of conscience, as the trust that society places in the engineer in matters of technology requires," the authors rhetorically respond: "What kind of mysterious common human conscience is this, and moreover still operating (!) in the precise sciences? Professor Tramdakh does not want to toss all his former pro-fascist concoctions overboard. He is keeping some of it and trying to prove the possibility of compromise between the ideologies of the imperialist bourgeoisie and Marxist-Leninist ideology."

Because of the lack of time, I cannot cite everything that blackens our Academy of Sciences and its work, sayings which belong basically to Arvid Pelshe, Academy of Sciences corresponding member. He essentially led the campaign against science in the 1940s-late 1950s and even 1960s. Not only the old specialists, but the communists—M. Kadek, Ya. Peyve, E. Sokol, and P. Dzerve, who was expelled from the ranks of corresponding members of the Academy of Sciences—were affected. It is satisfying today to know that the question of the posthumous restoration of the prominent economist's title will be resolved in a week by the Academy of Sciences general meeting.

Why must we speak of matters from days long past? A. Pelshe, Ya. Bumber, Ya. Yurgen and their yes-men were responsible for undermining the foundations of scientific ethics in Latvia to a significant extent. The social sciences were deformed in the Stalinist spirit and we are still feeling the consequences of this today. An entire generation of people went into science and the VUZs with somewhat distorted thinking. At the same time, I would like to say that Latvian science on the whole

withstood this test, and the traditions of scientific schools and ethics were preserved thanks to the old professors (I recall Gustav Vanag with respect, for example). Credit for this also belongs to the scientists and communists Peyve, Kadek, Fritsis Deglav, as well as republic leaders Ya. Kalnberzin and V. Latsis, who were attentive to science and opposed the worst changes that could have occurred, insofar as they were able to.

After President Ya. Peyve left for Moscow, Latvian science took a technocratic path, along with the overall processes in the republic after the events of 1959. True, it is also unquestionable that basic research had developed, new institutes had been created, Latvian science had become further integrated with union-wide science and new sectors had acquired authority, even on an international scale, at this time. The services of President K. Plaude in constructing buildings and strengthening the material and technical base are inarguable. However, a petty over-emphasis on practice, a technocratic approach, opportunism in the social sciences, and apologetics for the corresponding sociopolitical situations flourished in some institutes. Meanwhile, many ties between VUZs and the Academy of Sciences, maintained on the personal authority of scientists of the senior generation, had been destroyed. Scientific ethics, on which Academician R. Sagdeyev spoke aptly today, were lost with the change in generations.

Moreover, local science influenced the republic's economy with words more than actions. It was not felt in the main areas. Academician S. Giller, who strived to do research of international significance in organic chemistry and molecular biology, having combined basic research with practical results in creating new medicinal preparations, was a very dynamic individual in this period. Under his guidance, the Institute for Organic Synthesis was created and the complex in Olayne was created on his initiative. However, looking at the past, we see that the Olayne created by Giller became a drama both for him personally, as well as for all society. The all-union departments, to whose auspices the enterprises conceived of by him were transferred, distorted the original concept, polluted nature and used the republic's resources, leaving it only an insignificant share of the profits. It is also true that the republic's science contributed to developing a number of sectors—biotechnology, wood-pulp processing, robotics, peat hydrolysis, anti-corrosives and other areas of practical life. However, our industry and agriculture are not always ready to adopt science's proposals. The departmental approach, various barriers and bureaucratic obstacles interfere.

Unfortunately, a process of alienation between society and science is occurring, which is also characteristic of Latvia. For various reasons, as I stated this summer in Salaspilsa, science's prestige among youth is declining. In some scientists' minds, conservative tendencies, departmental and apologetic concepts, the failure to understand progressive trends in the development of Soviet society and to

understand the people's desires, the neglect of social thought, and alienation from the cultural life of the republic and from the creative intelligentsia have appeared.

It is no accident, as opposed to Estonia, that the creative intelligentsia, writers, artists and journalists, not scientists, were the first to show society its sore points and awaken the people from social apathy in Latvia. The voices of some scientists were among these at the beginning. The journalists D. Ivans and A. Snips first spoke of the Daugavpilsckaya GES, and later science, led by Academician R. Kukayn, took up the problem in its ecological aspect and carried it to the finish. In this regard, science's service is great. This has made it possible to raise other scientific problems in Olayne, Ventspils and Yurmala to a basic scientific level and focus society's attention on the Baltic Sea and the problems of polluting large and small rivers, which scientists at the Institute of Biology have been working on for years. Journalist M. Vulfson first raised the question of the deformations of 1940, and only then did historians start rejecting the outdated stereotyped interpretations of 1940 and the formation of the Latvian state system. The latest discussions and trends in this area promise much and society welcomes them.

It is surprising that social thinking changed so rapidly and that all restructuring processes in Latvia were activated from June to November—not quite 6 months. Scientists have also really begun being included in the processes of renovating the republic's life and are also among the authors of the Latvian Popular Front's program.

In my opinion, we now face three main tasks. The first is to lead the republic's economy out of a crisis condition and harmonizing ties with the center. The second is the economic and political sovereignty of Latvia. The third is the formation of new, proper international relations. Two more elements join these tasks: preserving and developing the cultural environment of Latvia and the genuine democratization of society.

These tasks cannot be solved without the participation of scientists. In the first place, the rehabilitation and even reanimation of the social sciences is required. Lawyers have been promoting their own competence in recent months. However, it seems to me, we must still seriously consider the question of questions: what is sovereignty, on what grounds is a Soviet federation created, how do the principles of a confederation and a federation tie together? Moreover, this must be considered not only from Latvian positions, but also those of other republics (for example, Turkmenia), from the viewpoint of world practice, proceeding from the harmonious future of the USSR. New courses and concepts are appearing in economic science. However, if the republic had received full sovereignty, would we have found scientifically trained, broadly thinking economic leaders who know how to conduct work, how to introduce completely new economic management principles and, moreover, how to

implement sensible ties with other republics where, possibly, the previous principles of economic management are still partially preserved? Should we not ask, in Fallada's words: so, how, little boy? Do we really know contemporary advanced world economic theories and approaches?

Everyone refers to the people, but it is not one people. The views that exist within it are not always known. Perhaps, a sociological service should be created which would periodically, but systematically study social life in its dynamics, the viewpoints of representatives of different peoples and social groups, and attitudes towards all possible situations—i.e., a sort of Latvian Gallup Institute. Recently, positive shifts have appeared in historical science. Nevertheless, it is clear that only professional historians, not journalists and writers, should study and interpret history and that this should be done objectively and honestly. The basis of bases for the historical sciences is the archive documents. These should be accessible. However, it is impossible to fully agree with those historians who only believe in documents ("No Document—No History"). There are eyewitnesses of events in 1940, 1941, 1949, 1959 and other years. Their testimonies must not be ignored. Abroad, so-called "oral history" is becoming increasingly popular—spoken history and memoirs. These testimonies should be included in the context of historical sciences. I appeal to a group of young scientists to comprehensively apply themselves to the subject "1988 in Latvia. A Third Awakening." Perhaps, this subject is worth including in the plans of the Institute of History. The processes should be studied soon, so that 15 years later we will not have to argue about what actually happened: a revolution or an occupation? History will give its own definitive answer, but contemporaries should also give their evaluations.

Unquestionably, the Union of Scientists will not be able to solve all of these problems. However, it will be able to promote discussions and the birth of alternative viewpoints and initiatives and it will help concentrate society's attention on one problem or another, make young people more active and promote them. This will introduce a scientific nature in society and the echelons of power and will make it possible more clearly to construct forecasts, even futuristic, regarding the future of Latvia and the entire Soviet Union. We must also know how to fantasize!

Today, our democracy has been given from above like a gift. I am standing here, like a rooster on a perch, and I have been permitted to utter one or another truth by "the highest and most gracious pleasure of his sovereign majesty," as they would have written about a hundred years ago. Yet, in the morning the words of a little song, popular in my student days, about a lark, singing beautifully in the sky, but suddenly falling silent, as though it had been shoved in a sack, could come true. For decades we have had no profound, organic democracy. Some of its weak traditions have still been preserved in the Baltic area since prewar years. However, the strong conservative tendencies of the period of Stalinism and Brezhnevism have been felt here as well.

With their artificial ideological pathos, primitive concept of collectivism, pseudo-internationalism, and reverence for regalia, titles and ranks, which anarchistic all-permissiveness and national narrow-mindedness are sometimes beginning to oppose now. I think that scientists, through their traditionally scientific approach, objectivity and style can give much to all of society, in particular, possibly, to the Russian-speaking part of Latvian society. I think that neo-Stalinist dogmatism is dangerous to this day. However, tendencies toward self-isolation and the loss of common human values could become dangerous tomorrow.

Two more questions. The first concerns ties between the higher school and the Academy of Sciences. In recent months, the rejection of our Academy of Sciences has become popular among young people. Allegedly, it is a formal bureaucratic structure foisted on our republic by the Stalinist system and, moreover, has become a bastion of conservatism. Supposedly, VUZ science should be primary in small republics. This viewpoint is being supported in Estonia as well as here—among future humanitarians. A few weeks ago, at a seminar in Liye-lupe, I tried to partially oppose this opinion and disclose my own opinion on the problem. All the same, we must think truly and realistically. We must not ignore those truly great achievements characteristic of our Academy of Sciences, and we must take its material base and traditions into account. It is another matter to reform VUZ science and its formal bureaucratic coordination, for which we should combine efforts on all levels—on both the horizontal, as well as the vertical.

The Academy of Sciences is somewhat elite, not democratic. However, elitism in science is necessary. Yes, science is elite. Intellect solves everything here, not the majority of votes. Opportunities to promote the most capable people in the course of honest competition should be equal. Elitism in science should not be based on titles and the names of posts, but only on the level of knowledge and measure of talent. As Academy of Sciences members, we must elect the most respected and competent specialists from higher schools, institutions, and the Academy of Sciences, as well as workers in culture, such as people's poet Imant Ziyedonis, who alone did more, possibly, for the realization of culture than an entire institute. We must extol not only the administrators in science and its organizers, as has occurred, unfortunately, in past decades. However, we must also not cultivate a prejudice against administrators and organizers. They are not an alien and harmful thing. In modern, complex collective science they are inevitable and often quite necessary—remember Giller. Everything depends on their capabilities, morals and skill in realizing the scientific process.

The second is regional science, basic science and international science. Right now, many people are saying that it is necessary to create a regional science in the republic which would mainly serve the republic's needs. Unquestionably, this is necessary, but not just this. Not all science should be like this. If science becomes a servant

to the economy, it turns into the day before yesterday's science. Priority should be given to basic research: the prestige of the nation lies in this. We should not break ties with the country's science, with the USSR Academy of Sciences, and with international science, although there is much that is imperfect, incorrect and formal in these ties also.

In the past, Latvian science had always developed in the context of world knowledge. In the future as well, we must rely on achievements by the scientific centers of the Soviet Union and of foreign countries, and the successes of scientists of Latvian origin, achieved in a foreign land. Since 1958 I have established valuable scientific contacts with Latvians abroad and with Baltic Germans. I have participated in two scientific and technical congresses of Latvians—in Montreal in 1976 and Munster in 1982. If I am not mistaken, about 1,500 scientists of Latvian origin and approximately 200-300 professors are working in emigration. It seems, we should neither overestimate nor underestimate the possible support of these foreign scientists. Remember Kristapa Keggi, professor of orthopedics, and the Keggi Fund which he created in Riga. Emigrants can become a unique kind of bridge which opens access into the large foreign VUZs where they work. Therefore, we should welcome the 9th Latvian Congress for Technical Sciences, which is being convened in Riga in 1991 on the suggestion of the Association of Latvian Engineers in Canada. Much preparatory work lies ahead so that 50-80-100 of the most outstanding Latvian scientists working abroad are truly represented, not 10-15 foreign enthusiasts. In my opinion, the Latvian Academy of Sciences and the Latvian Union of Scientists should define the status of a foreign member, as is being done in Armenia and Georgia.

There should be an exchange of scientists, regardless of their nationality. We are speaking out against migration with good grounds, but intellectual migration is a phenomenon of world practice. It would be appropriate, it seems, to attract truly talented, but still not evaluated in terms of worth, scientists to the VUZs of Latvia and the Academy of Sciences, who would be able to rouse our provincial minds and introduce new modern scientific concepts to us, for 2-3 years on contract. It would not be at all bad if some of them even learned Latvian and stayed here: in the end, Wilhelm Ostwald was a second generation immigrant to Riga.

There are many problems, in both science itself, as well as in its interaction with society. It is hard for me to evaluate our science on the whole, however, I would not claim that it is flourishing now. However, I would also not categorically assert the opposite and disparage our science, scientific potential, the Academy of Sciences and the VUZs.

We should not just wave our scientific degrees and titles, particularly to defend that which is outdated. We have no right to arrogantly turn aside from social thought, since social thought, in my opinion, comprehends many processes truly and strongly, practically, through pure intuition, and

then science provides it with substantiation. However, we must also not drag ourselves along on the tail of social thought: we must actively form it, in a constructive spirit, comprehending all that is progressive, appealing to people not to forget the realities of life. Today's reality is that we are a component part of the Soviet Union. The processes in Latvia are not only interrelated, but also directly depend on democratic transformations in the Soviet Union. Latvia cannot be free if Russia is not free.

Writers and journalists were the first to awaken the people. A big thanks to them, and thanks to Yanis Peters, Dzhemma Skulma, Daynis Ivans, and thanks to the Popular Front. However, the scientists are faced with studying these processes and helping to direct them onto a constructive track. Today's revolution needs scientists so that the revolution of 1988, singing and flag-decorated, becomes the intellectual revolution of 1989, so that from the pickets of 1988 in the future we will move to a trench war for democracy, for the struggle will be long and difficult.

I want to congratulate all of us for creating the Latvian Union of Scientists and at the same time to say that definite hopes are related to it. How great are they? This depends on whether we succeed in awakening young scientists (unfortunately, there are few of them among us: 20-30 out of 1,200), whether they will be made socially active both in social life, as well as in work. A great deal also depends on whether or not the Union becomes an arena for the manifestation of ambitions and place of fruitless debates and, heaven help us, whether or not it becomes a new bureaucratic structure. Substituting emotional arguments and illusions, isolation from large-scale science and unconstructive confrontation with the leadership of our republic and science, for dialogue will not gain the upper hand here.

The big problem is to really increase the prestige of science in Latvia and attract young people into this field of work. If there is no intelligentsia, no scientific intelligentsia, in Latvia, there will be no brain potential and there will be no restructuring. Then all the pretty words and all the programs for the republic's sovereignty will remain nothing but words.

Combining of Lithuanian VOIR's, NTO's Debated
18140084b Vilnius SOVETSKAYA LITVA in Russian
20 Oct 88 p 2

[Letter to the editors by A. Brazhenas, technical department chief, Klaypeda Refrigerated Fleet Base, with commentary by A. Kvedaravichyus, head, department for production work and wages, LiSSR Trade Union Council, commission member, LiSSR ONTT Council, under the rubric "Returning to What Was Published:" "Is It Really Necessary to Combine the NTO and VOIR?". Passages in boldface as published]

[Text] After reading the article by V. Plotnikov, honored inventor of the LiSSR, "A Year Later" (SOVETSKAYA LITVA, 27 Aug 88), I would like to voice several considerations on the subject which was raised.

The experiment, which stipulates combining the VOIR [All-Union Society of Inventors and Rationalizers] and NTO [Scientific and Technical Society] into a unified organization, the Society for Scientific and Technical Creativity (ONTT), has been under way for 2 years. This work is new and we must take the unbeaten path, since the experiment is being conducted only in our republic. What is the situation today?

This was discussed at the joint plenum of the LiSSR ONTT Council and sectorial republic NTO boards, which was held in May 1988. The existence of two contradictory opinions was brought to light. The first is that the experiment should be continued, while the second is that it should be stopped and we should return to the previous organizational structure for the inventors' movement, having revived the VOIR and the NTO.

I now turn to our primary organization's practice. In the collective of the Klaypeda Refrigerated Fleet Base, the combination of the VOIR and NTO primary organizations occurred in March 1987. Since no recommendations whatsoever from "above" existed at that time, the combination essentially took place mechanically, without the proper documentary and psychological preparation. As happens in such cases, the results, contradictory to the expected, soon made themselves known. In particular, specific work with inventors who were former VOIR members began to die down. Why? The ONTT council mainly works on developing new equipment, modernizing it, and improving management, i.e., performing the functions of the abolished NTO organization, yet it is as though rationalization work has gone into the background. Surprisingly, the indicators for inventor's work are lower here now, than they were last year. The only "achievement" is that the flow of paper work has been reduced.

In my opinion, the combination of the VOIR and NTO carries a charge more negative, than positive. I think that the structure of public scientific and technical organizations should incorporate the VOIR, the NTO and the Union of Inventors. It is necessary to see that, given common goals, they have their own areas of activity. Questions like public expert examination, exchanging advanced experience, and using information materials, as well as economic problems, are included in the NTO's sphere of activity, but in no way that of the VOIR. A delimitation of the organizations would have enabled the House of Engineers, the NTO councils and the VOIR to more clearly define the main directions in their work and avoid redundancy.

A. Brazhenas, technical department chief, Klaypeda Refrigerated Fleet Base.

As you can see, V. Plotnikov, honored inventor of the LiSSR, and A. Brazhenas, technical department chief, Klaypeda Refrigerated Fleet Base, have expressed contradictory opinions in our newspaper on the subject of the inventors' movement experiment being conducted in the

republic. A. Brazhenas, in particular, essentially suggests halting the experiment. He is not alone in this position. How well-founded are the arguments of those who support stopping the experiment? We are publishing a commentary by A. Kvedaravichyus, head, department for production work and wages, LiSSR Trade Union Council, commission member, LiSSR ONTT Council, summarizing the results of the experiment.

I think that inventors have started a very important discussion in SOVETSKAYA LITVA. Now, our internal debates and discussions have been made public, placed in society's court, and any inventor or rationalizer can express his viewpoint. Unquestionably, individual suggestions are really needed. After all, exploration is under way in organizing the inventor's movement in the republic.

It must be noted that for the time being the experiment has not created a new ONTT society, but has only joined the functions of the VOIR and NTO. In this regard, the territorial and sectorial structure of the creative organizations of inventors was preserved. Right now, the sole innovation is the fact that there are no longer two republic councils (VOIR and NTO), that one, the republic ONTT Council, has been created in their place. The sectorial boards of the NTO act as before, with the significant difference that they are now also responsible for concern for inventors and rationalizers. In other words, the sectorial NTO boards have taken the functions of the VOIR upon themselves. Moreover, the former city VOIR councils have now become city ONTT councils, whose staff includes representatives of the previously functioning VOIR and NTO.

This is the essence of the new organizational structure. Possibly, it is imperfect and needs improvement. However, this is hardly a reason, as the experiment's opponents believe, for returning to the separate existence of the VOIR and NTO, i.e., for halting the experiment. For example, the opponents of restructuring the work of the republic's technical societies believe that the principles for managing the new type of primary organization, on the part of sectorial NTO agencies and on the part of regional agencies (simultaneously), are incompatible. However, what is surprising is that they only establish this incompatibility, instead of finding the optimum principles for "dividing" these spheres of influence, together with the supporters of the experiment (and, as V. Plotnikov justifiably writes in his article "A Year Later," they are in the absolute majority). It turns out that the participants in the experiment are calling for a step forward, but their opponents—for standing in place. To put it simply, it seems that the position of those who oppose the experiment contradicts the spirit of innovation itself.

Furthermore, A. Brazhenas complains about the fact that the combination of the primary NTO and VOIR organizations took place without the corresponding instructions and recommendations. This was also the

reason that the combination "... took place mechanically, without the proper documentary and psychological preparation." Indeed, at the start of the experiment there were no instructions or recommendations—they were still being developed. However, let us consider: was it really impossible to approach the matter creatively, without documents and orders "from above," and solve all problems proceeding from the specific situation at this same Klaypeda Refrigerated Fleet Base? Is the arrival of an emissary from Vilnius really necessary for this? It turns out that the habit of working only according to instructions is alive to this day among the primary organization activists at the Klaypeda Base.

In conclusion, I would like to remind the readers that in his article, the honored inventor V. Plotnikov suggested discussing the shortcomings, which exist in the experiment's organization and in the structure of the present-day management of the inventor's movement, and finding new forms and methods for ONTT work and their interaction with sectorial NTO's. Today, precisely such a discussion is needed.

Debate on Lithuanian NTO-VOIR Reorganization Continues

18140096 Vilnius SOVETSKAYA LITVA in Russian
13 Nov 88 p 2

[Article by Candidate of Economic Sciences V. Bolshakov, Candidate of Philosophical Sciences Z.-V. Morkunas, and Candidate of Philosophical Sciences V. Skripov under the rubric "Returning to What Was Printed": "Measures or Half Measures. How to Increase the Creative Activity of Innovators"]

[Text] In the disputes about the effectiveness of the experiment on uniting in Lithuania scientific and technical societies and the All-Union Society of Inventors and Efficiency Experts into the Society of Scientific and Technical Creativity (ONTT), a large number of doubts regarding the advisability of such a step have been voiced. Some people assert even that the experiment has not improved, but has worsened the situation in the sphere of invention and efficiency promotion: it has created confusion in case of the payment of membership dues and in the interrelations between sectorial and territorial organs. Figures on the decrease of the number of authors, who have submitted efficiency proposals and inventions, and so on have been cited.

We believe that one should not hasten with such conclusions. Let us examine this process in more long-term dynamics, in order not to get the causes and consequences mixed up. For example, if only from the early 1970's.

The number of authors of efficiency proposals and inventions during the period from 1972 to 1980 increased from 42,600 to 60,600. Such an increase, in our opinion, reflected first of all the pace of development of production in the republic during those years. But then the rate of increase declines: in 1985—63,950, in

1986—63,980. The figures in the area of invention are even more striking: whereas in 1980, 2,112 inventions were used in the republic, in 1985, 1,390 were used, while in 1986, 1,274 were used. That is, the trend toward decline in the sphere of engineering creativity appeared long before the start of the experiment. And that is why it is hardly logical to accuse the experiment of it; the Society of Scientific and Technical Creativity was merely faced with powerful inertia, the causes of which, obviously, have deep roots.

The experiment has concerned thus far only structural changes in the management of scientific and technical societies and the All-Union Society of Inventors and Efficiency Experts. The causes of the decline of the creative activity of engineers are not of a regional nature and are formed by many factors of the political, economic, and social life of the country. They were revealed at the 27th congress and the 19th Party Conference: the shortage of financial resources, the lack of a material base of scientific creativity and the slow pace of its modernization, the decrease of the prestige of the labor of a scientist and engineer, shortcomings in stimulation, the difficulties of the introduction and dissemination of innovations, and so forth. Undoubtedly, the lack of genuine democracy in society, conservatism in the methods of management of the economy, and the shortage of true information on the state of scientific and technical progress in the country in comparison with the world level also adversely affected the activity of people.

All this had the result that the state, which has enormous resources and an enormous scientific and technical potential, is receiving one-tenth as great a return from scientific and technical creativity as the developed capitalist countries are (for comparison: in the USSR it is 38 billion rubles a year, in the United States it is \$400 billion a year). Not more than 4 percent of the specialists and scientists are participating in invention, in spite of perennial appeal and command steps of influence; moreover, the share of highly effective inventions in their activity comes to only 1.5 percent, while the percentage of inventions, which ensure a breakthrough in the area of qualitatively new technologies, does not exceed 0.3 percent.

Therefore, before judging the efficiency of one system of management or another, it is necessary to answer the question: What is checking the development of creative initiative?

Let us return to the subject of the discussion. What did the conditions of the experiment give the scientist, the engineer, and the innovator? How did the conditions of creative activity actually change?

Publications in the press and the results of the sociological studies conducted in the republic show that the majority of creative worker are not satisfied with the conditions of activity. Things are bad with information,

leveling reigns in remuneration, innovators cannot influence the technical policy of the development of enterprises and have been restricted in rights. It is necessary to give the organizers of the experiment their due—they saw the state of affairs before its start and wanted to agree to more radical changes. But it proved to be difficult to overcome the inertia of thinking in the established system of management of scientific and technical progress. The numerous consultations and specifications of the statute on the experiment reduced it merely to structural changes.

The main obstacle to technical creativity lies in the retention of the technocratic, departmental approach to the management of scientific and technical progress. Given such an approach at enterprises the plans of production remain the basic indicators, while the indicators of scientific and technical progress and the indicators, which characterize the conditions of the creative activity of innovators, often are entirely lacking. The person as the main goal and means of the development of society does not fit into the framework of the administrative command system.

In the charter of scientific and technical societies it was repeatedly declared that "the stimulation of creative activity" is the goal of the organization. But the explanations do not go farther than general appeals ("increase," "achieve," and so forth). There remain essentially open the questions: How can the member of a scientific and technical society in practice influence the policy of an enterprise? In what way can he change the technically incompetent decision of the chief engineer? Can this public organization participate in the management of scientific and technical progress, and if so, how? What is the object of management, what are its forms and methods?

A "brilliant" move was found to eliminate all these questions—the councils of scientific and technical societies at enterprises were headed by...the chief engineers. Public and administrative management were merged in one person. In the best traditions of the times of stagnation all the complaints meant for the organizers of technical creativity are now getting to the organizers themselves. And they decide everything themselves: if I want to, I pay for an invention, if I want to, I do not pay, if you are dissatisfied, look for a job. All problems are shut within the organization.

The basic indicators of the activity of the scientific and technical society until recently were: the number of members, the amount of membership dues, and the number of implemented measures. The economic effectiveness from the introduction of developments is not for it a mandatory criterion in the evaluation of activity. Thus, there is no direct link between the remuneration of the labor of workers of the staff of the scientific and technical society and the end results.

The sectorial boards of scientific and technical societies are financed by means of assets which are approved from above. But there the principle "from what has been achieved" dominates. When the estimate turns into a plan, the main task is to spend it. Does not the reason that the majority of sectorial boards of scientific and technical society are speaking out today against unification with the All-Union Society of Inventors and Efficiency Experts, lie in this placidity?

For the substantial change of things and the acceleration of scientific and technical progress it is necessary to eliminate all these incongruities and to create the necessary conditions for creative activity. What kind of conditions are these? The sociological studies being conducted are providing the following picture. Among creative workers satisfaction with the results of their work and the opportunity to see them are in first place. Further, participation in the making of decisions on the technical policy of the enterprise, the right to independence in creative activity, and, finally, fair remuneration are indicated. Specific suggestions on how to change the situation are also voiced: the establishment of clubs and circles of all ages, "banks of ideas," cost accounting centers, and centers of implementation for those instances, which the innovator does not find support and understanding in his own organization. The question of the procuring of additional outlays for the equipment of schools, clubs, and circles, which have been furnished with advanced equipment—oscillographs, computers, and so forth—and of the better supply of the technical libraries of enterprises with recent publications is also being raised.

In particular, such a question as the effectiveness of the conferences and symposiums, which are being held in the republic, with respect to the sharing of advanced scientific and technical know-how merits attention. For the most part people gather at them to state a problem, and not to solve it. At times 200 reports are fit in the 200 pages of a collection. Who needs such superficial information? Too little rapid information on individual directions of scientific and technical progress is being published. Such journals and collections should be published not once a quarter or month, but once a week (in the United States, for example, of the 12,000 journals 10,000 are weeklies).

The main conclusion from what has been said is that the problems in scientific and technical progress should not accumulate, they should be revealed and solved in good time. For this along with the departmental management of scientific and technical progress, the public self-management of the creative process should be established to counterbalance it. It is necessary for creative workers to be united in a union, which is free of administration by mere decree, bureaucracy, and strong-willed decisions. The union of the societies for the promotion of scientific and technical progress could ensure such unity.

Ryzhkov Opens Arctic Research Conference
18140090 Moscow SOVETSKAYA ROSSIYA
in Russian 13 Dec 88 p 1

[Speech by N. Ryzhkov, chairman, USSR Council of Ministers: "To Participants in the Conference of Near-Arctic States on Coordinating Scientific Research in the Arctic"]

[Text] I heartily welcome participants in the conference of Near-Arctic states, who have met to discuss the problems of coordinating scientific research in the Arctic.

This conference is taking place in an important period. The positive shifts which are now occurring in the international situation are opening up favorable prospects for joint exploration and the solution of the most difficult contemporary problems for countries with different socioeconomic systems. In this context, the northern countries hold an important place, in particular in solving international security problems in developing measures of trust and strengthening peace.

The Arctic and northern areas of our planet conceal an enormous potential for constructive political, economic, scientific and technical cooperation. The interests of a number of states which use the tremendous, but still insufficiently studied natural resources of the Arctic

converge here. The growth in the scale of this activity requires a responsible and well-considered position and profound scientific studies by Near-Arctic states.

The Arctic also has a colossal role in maintaining the ecological balance of our entire planet. Nature in this region is exceptionally sensitive and prone to injury, and its utilization should be carried out extremely carefully, with particular circumspection.

Precisely for this reason, the Arctic is particularly in need of cooperation among scientists and specialists for the purpose of developing a coordinated scientific policy, aimed at studying and developing resources in the region and the creation of a system for international ecological security. Only through joint efforts will it be possible to preserve the unique nature of this region, the senseless exploitation of which has already led in a number of places to extremely dangerous ecological changes in the condition of the surrounding environment and to worsened living conditions for its population, especially for native populations.

United and cooperating, the scientists of Near-Arctic states are an excellent example of the new thinking, which will be able to ensure mankind's common interests in the present and the future.

I wish you fruitful work and success in your noble task.

1988 USSR State Prizes for Science & Technology Announced

18140081 Moscow PRAVDA in Russian
7 Nov 88 pp 1, 2

[Decree signed by M. Gorbachev, CPSU Central Committee secretary, and N. Ryzhkov, USSR Council of Ministers chairman: "CPSU Central Committee and USSR Council of Ministers Decree: On Awarding the USSR State Prizes in Science and Technology for 1988"]

[Text] Having examined the proposal of the Committee on USSR Lenin and State Prizes in Science and Technology, under the USSR Council of Ministers, the CPSU Central Committee and USSR Council of Ministers decree:

To award the USSR State Prizes for 1988 to:

I. In Science

1. Vladimir Nikolayevich Ageyev, doctor of physical and mathematical sciences, laboratory head, Physical and Technical Institute imeni A.F. Ioffe, USSR Academy of Sciences, Eleonora Yakovlevna Zandberg, Aleksandr Yanovich Tontegod, doctors of physical and mathematical sciences, leading scientific associates, Nikolay Ilich Ionov, doctor of physical and mathematical sciences, Mikhail Aleksandrovich Mitstev, Vladimir Ilich Paleyev, candidates of physical and mathematical sciences, senior scientific associates, employees at the same institute; Leonid Aleksandrovich Bolshov, doctor of physical and mathematical sciences, laboratory chief, Institute of Atomic Energy imeni I.V. Kurchatov; Yuriy Grigoryevich Ptushinskiy, Ukrainian SSR Academy of Sciences corresponding member, deputy director, UkSSR Academy of Sciences Institute of Physics, Valentin Kuzmich Medvedev, doctor of physical and mathematical sciences, laboratory head, Aleksey Grigoryevich Fedorus, doctor of physical and mathematical sciences, leading scientific associate, Anton Grigoryevich Naumovets, doctor of physical and mathematical sciences, department head, associates at the same institute; Utkur Khasanovich Rasulev, UzSSR Academy of Sciences corresponding member, director, UzSSR Academy of Sciences Institute of Electronics imeni U.A. Arifov—for the series of works "Issledovaniye Protseessov Termicheskoy Desorbtsii Neytralnykh i Zaryazhennykh Chastits na Poverkhnosti Tverdykh Tel" [Research on Processes of Thermal Desorption of Neutral and Charged Particles on the Surface of Hard Bodies], published in 1965-1984.

2. Pavel Dmitriyevich Altukhov, candidate of physical and mathematical sciences, senior scientific associate, USSR Academy of Sciences Physical and Technical Institute imeni A.F. Ioffe, Grigoriy Yezekiyelevich Pikus, doctor of physical and mathematical sciences, leading scientific associate, Aleksandr Aleksandrovich Rogachev, doctor of physical and mathematical sciences,

laboratory head, associates at the same institute; Yaroslav Yevgenyevich Pokrovskiy, USSR Academy of Sciences corresponding member, laboratory head, USSR Academy of Sciences Institute for Radio Engineering and Electronics, Aleksandr Serafimovich Kaminskiy, doctor of physical and mathematical sciences, leading scientific associate, Valentin Aleksandrovich Karasyuk, candidate of physical and mathematical sciences, scientific associate, employees at the same institute; Vladislav Borisovich Timofeyev, doctor of physical and mathematical sciences, deputy director, USSR Academy of Sciences Institute of Hard Body Physics, Vladimir Dmitriyevich Kulakovskiy, doctor of physical and mathematical sciences, leading scientific associate at the same institute; and Svyatoslav Anatolyevich Moskalenko, doctor of physical and mathematical sciences, department head, Moldavian SSR Academy of Sciences Institute of Applied Physics—for the series of works "Mnogoeksitonnyye Kompleksy v Poluprovodnikakh" [Multi-Exciton Complexes in Semiconductors], published in 1958-1986.

3. Roman Leonidovich Sorochenko, doctor of physical and mathematical sciences, chief scientific associate, Physics Institute imeni P.N. Lebedev, USSR Academy of Sciences, Iozas Iozas Berulis and Grigoriy Timofeyevich Smirnov, candidates of physical and mathematical sciences, scientific associates, Aleksandr Yefimovich Salomonovich, doctor of physical and mathematical sciences, leading scientific associate-consultant, associates at the same institute; Nikolay Semenovich Kardashev, USSR Academy of Sciences corresponding member, deputy director of the USSR Academy of Sciences Institute for Space Research; Eduard Vladimirovich Borodzich, senior scientific associate, All-Union Scientific Research Institute for Mineral Raw Materials; Aleksandr Aleksandrovich Konovalenko and Leonid Grigoryevich Sodin, doctors of physical and mathematical sciences, leading scientific associates, UkSSR Academy of Sciences Radio Astronomy Institute; Aleksandr Fedorovich Dravskikh, candidate of physical and mathematical sciences, laboratory head, USSR Academy of Sciences Special Astrophysics Observatory, Zoya Vasilyevna Dravskikh, candidate of physical and mathematical sciences, scientific associate at the same observatory; Yevgeniy Yevgenyevich Lekht, candidate of physical and mathematical sciences, senior scientific associate, State Astronomy Institute imeni P.K. Shternberg—for the series of works "Otkrytiye i Issledovaniye Spektralnykh Radiolinyi Vysokovobuzhdennykh Atomov (Rekombinatsionnykh Radiolinyi)" [Discovery and Research on Spectral Lines of Highly-Excited Atoms (Recombination Lines)], published in 1959-1986.

4. Ildus Bariyevich Khaybullin and Yevgeniy Ivanovich Shtyrkov, doctors of physical and mathematical sciences, chief scientific associates, Kazan Physical and Technical Institute of the USSR Academy of Sciences Kazan Branch, Maksut Mukhamedzyanovich Zaripov, doctor of physical and mathematical sciences, director, Mansur

Falyakhutdinovich Galyautdinov and Rustem Makhmudovich Bayazitov, candidates of physical and mathematical sciences, senior scientific associates, employees at the same institute; Leonid Stepanovich Smirnov, doctor of physical and mathematical sciences, department head, USSR Academy of Sciences Siberian Department Institute of Semiconductor Physics, Leonid Naumovich Aleksandrov, doctor of physical and mathematical sciences, chief scientific associate, Grigoriy Arkadyevich Kachurin, doctor of physical and mathematical sciences, leading scientific associate, Anatoliy Vasilyevich Dvurechenskiy, candidate of physical and mathematical sciences, laboratory head, associates at the same institute; Yuriy Valentinovich Kovalchuk, doctor of physical and mathematical sciences, deputy director, USSR Academy of Sciences Physical and Technical Institute imeni A.F. Ioffe, Yuriy Vasilyevich Pogorelskiy, candidate of physical and mathematical sciences, scientific associate at the same institute; and Yuriy Vasilyevich Kopayev, doctor of physical and mathematical sciences, chief scientific associate, USSR Academy of Sciences Physics Institute imeni P.N. Lebedev—for the series of works "*Otkrytiye Yavleniya Impul'snoy Oriyentirovannoy Krystallizatsii Tverdykh Tel (Lazernyy Otzhig)*" [Discovery of the Phenomenon of Impulse Oriented Crystallization of Hard Bodies (Laser Annealing)], published in 1974-1986.

5. Aleksey Alekseyevich Dezin, doctor of physical and mathematical sciences, leading scientific associate, USSR Academy of Sciences Mathematics Institute imeni V.A. Steklov—for the monograph "*Obshchiye Voprosy Teorii Granichnykh Zadach*" [General Questions of Boundary Problem Theory], published in 1980.

6. Yuriy Vladimirovich Yegorov and Vladimir Aleksandrovich Kondratyev, doctors of physical and mathematical sciences, professors, Moscow State University imeni M.V. Lomonosov, Olga Arsenyevna Oleynik, doctor of physical and mathematical sciences, department head at the same university; and Lev Dmitriyevich Kudryavtsev, USSR Academy of Sciences corresponding member, chief scientific associate, USSR Academy of Sciences Mathematics Institute imeni V.A. Steklov—for the series of works "*Issledovaniya Krayevykh Zadach Dlya Differentsialnykh Operatorov i ikh Prilozheniya v Matematicheskoy Fizike*" [Studies of Boundary Problems for Differential Operators and Their Application in Mathematical Physics], published in 1959-1985.

7. Aleksey Nikolayevich Baraboshkin, academician, director, USSR Academy of Sciences Urals Department Institute of Electrochemistry, Viktor Petrovich Stepanov, doctor of chemical sciences, deputy director, Nikolay Grigoryevich Ilyushchenko, Vladimir Yakovlevich Kud'yakov and Mikhail Vladimirovich Smirnov, doctors of chemical sciences, and Leonid Yevgenyevich Ivanovskiy, doctor of technical sciences, laboratory heads, Valentin Nikolayevich Nekrasov and Vladimir Antonovich Khokhlov, doctors of chemical sciences, Irina Nikolayevna Ozeryana, candidate of technical sciences, leading scientific associate, Nina Arkhipovna Saltykova,

candidate of chemical sciences, senior scientific associate, all employees at the same Institute of Electrochemistry—for the series of works "*Razrabotka Osnov Fizicheskoy Khimii i Elektrokhimii Rasplavlennykh Elektrolitov*" [Development of the Foundations for the Physical Chemistry and Electrochemistry of Fused Electrolytes], published in 1957-1986.

8. Viktor Adolfovich Benderskiy, doctor of physical and mathematical sciences, head of laboratory, USSR Academy of Sciences Institute for Energy Problems in Chemical Physics; Yakov Sergeyevich Lebedev, doctor of chemical sciences, laboratory head, USSR Academy of Sciences Institute of Chemical Physics, Oleg Yakovlevich Grinberg and Aleksandr Anatolyevich Dubinskiy, candidates of physical and mathematical sciences, and Olga Yevgenyevna Yakimchenko, candidate of chemical sciences, senior scientific associates at the same institute; Yuriy Dmitriyevich Tsvetkov, USSR Academy of Sciences corresponding member, deputy director, USSR Academy of Sciences Siberian Department Institute of Chemical Kinetics and Combustion, Arnold Moiseyevich Raytsimling, doctor of chemical sciences, and Aleksandr Dmitriyevich Milov, candidate of physical and mathematical sciences, leading scientific associates, Sergey Andreyevich Dzyuba and Sergey Alekseyevich Dikanov, candidates of physical and mathematical sciences, senior scientific associates, all employees at the same Institute of Chemical Kinetics and Combustion—for the series of works "*Razrabotka Metodov Elektron'nogo Paramagnitnogo Rezonansa Vysokogo Razresheniya*" [Development of Methods for High Resolution Electronic Paramagnetic Resonance], published in 1968-1986.

9. Grigoriy Maksimovich Bongard-Levin, USSR Academy of Sciences corresponding member, head of sector, USSR Academy of Sciences Institute of Eastern Studies, and Grigoriy Fedorovich Ilin, doctor of historical sciences—for the monograph "*Indiya v Drevnosti*" [India in Antiquity], published in 1985.

10. Yelena Nikolayevna Kondratyeva, USSR Academy of Sciences corresponding member, professor, Moscow State University imeni M.V. Lomonosov, Sergey Vasilyevich Shestakov, USSR Academy of Sciences corresponding member, Mikhail Viktorovich Gusev, Andrey Borisovich Rubin and Feliks Fedorovich Litvin, doctors of biological sciences, department heads at the same Moscow State University; Boris Vasilyevich Gromov, doctor of biological sciences, department head, Leningrad State University imeni A.A. Zhdanov; Ivan Nikolayevich Gogotov, doctor of biological sciences, laboratory head, USSR Academy of Sciences Institute for Soil Studies and Photosynthesis; Viktor Yefimovich Semenenko, doctor of biological sciences, laboratory head, USSR Academy of Sciences Institute of Plant Physiology imeni K.A. Timiryazev; and Vladimir Mikhaylovich Gorlenko, doctor of biological sciences, laboratory head, USSR Academy of Sciences Institute of Microbiology—for a number of works on the biology and biotechnology of photosynthesizing micro-organisms, published in 1965-1986.

11. Valeriy Aleksandrovich **Altov**, doctor of technical sciences, department chief, All-Union Scientific Research Institute for Metrological Service; Vladimir Vladimirovich **Andrianov**, doctor of technical sciences, and Kamo Seropovich **Demirchyan**, academician, laboratory heads, Vladimir Borisovich **Zenkevich**, doctor of technical sciences, head of department, Mark Germanovich **Kremlev**, candidate of physical and mathematical sciences, senior scientific associate, and Roman Germanovich **Mints**, doctor of physical and mathematical sciences, head of sector, associates at the USSR Academy of Sciences Institute for High Temperatures, Vyacheslav Vladimirovich **Sychev**, doctor of technical sciences, former department head at the same institute; Viktor Yefimovich **Keylin**, doctor of technical sciences, and Yevgeniy Yuryevich **Klimenko**, doctor of physical and mathematical sciences, laboratory chiefs, Institute of Atomic Energy imeni I.V. Kurchatov—for the series of works "*Stabilizatsiya Sverkhprovodyashchikh Sistem* [Stabilization of Superconducting Systems], published in 1964-1986.

12. Igor Alekseyevich **Bolshakov**, doctor of technical sciences, head of sector, All-Union Institute for Scientific and Technical Information; Yuriy Petrovich **Borisov**, candidate of technical sciences, department head, Moscow Energy Institute, Lev Solomonovich **Gutkin**, doctor of technical sciences, professor-consultant at the same institute; Vladimir Borisovich **Pestryakov** and Boris Ruvimovich **Levin**, doctors of technical sciences, professors, Moscow Electrotechnical Institute for Communications; Matvey Vasilyevich **Maksimov**, doctor of technical sciences, chief of department, Military Aerial Engineering Academy imeni Professor N.Ye. Zhukovskiy; Ruslan Leontyevich **Stratonovich**, doctor of physical and mathematical sciences, professor, Moscow State University imeni M.V. Lomonosov; Georgiy Petrovich **Tartakovskiy**, doctor of technical sciences, department chief at a scientific research institute; Yuriy Georgiyevich **Sosulin**, doctor of technical sciences, professor, Moscow Aviation Institute imeni Sergo Ordzhonikidze; Saveliy Yeremeyevich **Falkovich**, doctor of technical sciences, department head, Kharkov Aviation Institute imeni N.Ye. Zhukovskiy; and Yakov Davidovich **Shirman**, doctor of technical sciences, senior scientific associate, Military Engineering Radio Technology Academy for Air Defense imeni Marshal of the Soviet Union L.A. Govorov—for a number of works on the statistical theory of radio electronic systems and devices, published in 1966-1986.

13. Anatoliy Vasilyevich **Vashkovskiy**, doctor of physical and mathematical sciences, head of laboratory, USSR Academy of Sciences Institute of Radio Engineering and Electronics, Petr Yefimovich **Zilberman** and Viktor Ivanovich **Zubkov**, doctors of physical and mathematical sciences, leading scientific associates, and Viktor Nikolayevich **Kildishev**, leading engineer, associates at the same institute; Orest Genrikhovich **Vendik**, doctor of technical sciences, department head, Leningrad Electrotechnical Institute imeni V.I. Ulyanov (Lenin), Boris

Antonovich **Kalinikos**, doctor of physical and mathematical sciences, professor at the same institute; Vadim Vasilyevich **Danilov**, doctor of physical and mathematical sciences, department head at Kiev State University imeni T.G. Shevchenko, Nikolay Ivanovich **Lyashenko**, doctor of physical and mathematical sciences, professor at the same university; Boris Matveyevich **Lebed**, doctor of technical sciences, and Yuriy Mikhaylovich **Yakovlev**, doctor of physical and mathematical sciences, laboratory chiefs at a scientific research institute; Boris Pimonovich **Nam**, candidate of technical sciences, laboratory chief, All-Union Scientific Research Institute for Electronic Engineering Materials; and Aleksandr Grigoryevich **Guryevich**, doctor of physical and mathematical sciences, leading scientific associate, USSR Academy of Sciences Physical and Technical Institute imeni A.F. Ioffe—for developing the scientific foundations of spin-wave microwave electronics.

II. In Technology

1. Vladimir Ivanovich **Belykh**, chief geologist, Nikolay Alekseyevich **Sokolov** and Vladimir Vladimirovich **Dvoynin**, candidates of geological and mineral sciences, chief geologists of party, Mikhail Grigoryevich **Chmaro**, chief hydrogeologist, Stanislav Fedorovich **Konstantinov**, master driller, employees of the Belgorod Geological Prospecting Expedition, Production Geological Association for Central Rayons, Viktor Nikolayevich **Boydachenko**, candidate of geological and mineral sciences, chief geophysicist, Vladislav Pavlovich **Dmitriyev**, candidate of geological and mineral sciences, chief geologist, and Igor Semenovich **Vasserman**, chief of party, Voronezh Geological and Geophysical Expedition, employees of the same Production Geological Association for Central Rayons; and Nikolay Ivanovich **Golivskin**, candidate of geological and mineralogical sciences, leading scientific associate, All-Union Scientific Research Institute for Mineral Raw Materials—for the comprehensive prospecting of unique iron ore deposits in the Oskolskiy Rayon of the Kursk magnetic anomaly.

2. Vyacheslav Vladimirovich **Gaydyshev**, acting chief geologist of expedition, Central-Kazakhstan Production Geological Association, Nikolay Anatolyevich **Ko**, department geologist, I category, Gennadiy Bronislavovich **Karpovich**, expedition chief, Yevgeniy Tarasovich **Pedash**, chief geologist of expedition, Nikolay Yakovlevich **Kovalenko**, chief engineer of party, Yuriy Vasilyevich **Yakovenko**, expedition geologist, I category, and Vladimir Vladimirovich **Gulayev**, master driller, employees at the same association; Leopold Fedorovich **Dumler**, doctor of geological and mineralogical sciences, professor, Karaganda Polytechnical Institute; Nikolay Aleksandrovich **Drizhd**, candidate of technical sciences, general director, Karaganda Production Association for Coal Mining; Vladimir Nikolayevich **Zavrazhnov**, chief of party, Central-Kazakhstan Expedition, Moscow State University imeni M.V. Lomonosov; and Robert Ivanovich **Ridel**, candidate of technical sciences, deputy director, "Karagandagiproschakht" State Design Institute—

for the discovery, accelerated prospecting and preparation for industrial development of the Shubarkolskiy Coal Deposit.

3. Yevsey Iosifovich **Galperin**, doctor of technical sciences, head of laboratory, USSR Academy of Sciences Institute of Earth Physics imeni O.Yu. Shmidt, Lev Lvovich **Khudzinskiy**, candidate of technical sciences, senior scientific associate at the same institute; Boris Mikhaylovich **Bazlov**, chief engineer, "Krasnodarneftegeofizika" Production Association, Ivan Mikhaylovich **Muzyk**, candidate of technical sciences, chief of party for the same association; Boris Zalmanovich **Labkovskis**, chief of party for the "Grozneftegeofizika" Production Association; Yuriy Davidovich **Mirzoyan**, candidate of technical sciences, head of laboratory, Scientific Research Institute for Maritime Geophysics; Galina Yefimovna **Rudenko** and Grigoriy Aronovich **Shekhtman**, candidates of technical sciences, senior scientific associates, All-Union Scientific Research Institute for Geophysical Prospecting Methods; Vladimir Arkadyevich **Teplitskiy**, doctor of geological and mineralogical sciences, department head, All-Union Scientific Research Institute for Geological Oil Prospecting; Antonina Vasilyevna **Frolova**, senior geophysicist, "Neftegeofizika" Scientific Production Association expedition; Nazim Aligeydarovich **Karayev**, doctor of physical and mathematical sciences, department head, All-Union Scientific Research Institute for Prospecting Geophysics—for creating a vertical seismic profiling method which provides for increased effectiveness in the exploration for and prospecting of useful mineral deposits.

4. Vladimir Petrovich **Moskalenko**, doctor of economic sciences, deputy general director, Sumskiy Machine Building Scientific Production Association imeni M.V. Frunze, May Fedorovna **Balan**, candidate of economic sciences, department chief, Lyudmila Aleksandrovna **Abramitova**, deputy department chief, Aleksey Vasilyevich **Makeyev**, Yuriy Kirillovich **Bratushka**, Yuriy Dmitriyevich **Kudryavtsev** and Vladimir Nikolayevich **Tkachenko**, administration chiefs, Ivan Vasilyevich **Verbitskiy**, sector chief, Nikolay Aleksandrovich **Berestovskiy**, chief economist, Anatoliy Pavlovich **Voronenko**, section chief, and Nikolay Petrovich **Obozniy**, party committee secretary, all workers at the same association—for developing and applying new economic management principles at the Sumskiy Machine Building Scientific Production Association imeni M.V. Frunze.

5. Mikhail Sergeyevich **Butenko**, general director, "Tselinogradselmash" Production Association for producing agricultural machines for soil-protecting technologies, Khaim Khaimovich **Rozenfeld**, chief engineer at the same association; Genrikh Petrovich **Kuzmin**, chief, Head Specialized Design Bureau for Anti-Erosion Equipment, Robert Borisovich **Iordanskiy**, department head, and Veniamin Timofeyevich **Suchkov**, chief engineer, associates at the same specialized design bureau; Losal Khosikovich **Kim**, candidate of technical sciences,

former laboratory head, Scientific Production Association for for Agricultural Machine Building; Anatoliy Pavlovich **Gribanovskiy**, doctor of technical sciences, laboratory head, Kazakh Scientific Production Association for the Mechanization and Electrification of Agriculture; Aleksandr Semenovich **Buryakov**, candidate of technical sciences, department head, All-Union Scientific Research Institute for Grain Farming imeni A.I. Barayev; Anatoliy Petrovich **Spirin**, doctor of agricultural sciences, department head, All-Union Scientific Research Institute for Mechanizing Agriculture; Lyubova Konstantinovna **Klepach**, former department chief, All-Union Industrial Association for the Production of Soil Cultivating and Sowing Machines; Nikolay Vladimirovich **Bagdasarov**, subdepartment chief specialist, USSR State Agroindustrial Committee; and Nikolay Ivanovich **Yermolenko**, director, Tselinniy State Machine Testing Station—for developing highly productive machines for soil-protecting agriculture and introducing them in agricultural production.

6. Vitaliy Alekseyevich **Bukharin**, USSR Academy of Medical Sciences corresponding member, deputy director, USSR Academy of Medical Sciences Institute of Cardiovascular Surgery imeni A.N. Bakulev, Vladimir Petrovich **Podzolkov** and Georgiy Edvardovich **Falkovskiy**, doctors of medical sciences, department heads at the same institute—for developing new reconstructive methods for the surgical treatment of complex congenital heart diseases and applying them in clinical practice.

7. Valentin Mikhaylovich **Buyanov** and Yuriy Aleksandrovich **Nesterenko**, doctors of medical sciences, department heads at the 2nd Moscow Medical Institute imeni N.I. Pirogov; Mikhail Viktorovich **Danilov**, doctor of medical sciences, senior scientific associate, USSR Academy of Medical Sciences Institute of Surgery imeni A.V. Vishnevskiy, Fridon Ippolitovich **Todua**, doctor of medical sciences, laboratory leader at the same institute; Kim Nikolayevich **Tsatsanidi**, doctor of medical sciences, department head, USSR Academy of Medical Sciences All-Union Scientific Center for Surgery; Eduard Izrailevich **Galperin**, doctor of medical sciences, laboratory head, 1st Moscow Medical Institute imeni I.M. Sechenov; Vladimir Ivanovich **Filin**, doctor of medical sciences, chief surgeon, Leningrad Clinical Hospital of the USSR Academy of Sciences Administration of Affairs; Sergey Aleksandrovich **Shalimov**, doctor of medical sciences, department head, Kiev State Institute for Improving Doctors; Viktor Andreyevich **Kozlov**, doctor of medical sciences, department head, Sverdlovsk Medical Institute; and Yuriy Valentinovich **Ognev**, doctor of medical sciences, department head, Joint Hospital of the Fourth Main Administration under the USSR Ministry of Health—for developing new methods for the surgical treatment of pancreatitis and its complications.

8. Vasily Ivanovich **Kolesov**, doctor of medical sciences, former department head, 1st Leningrad Medical Institute imeni Academician I.P. Pavlov; Vladimir Semenovich **Rabotnikov**, David Georgiyevich **Ioseliani** and

Yuriy Samuilovich **Petrosyan**, doctors of medical sciences, department leaders, USSR Academy of Medical Sciences Institute of Cardiovascular Surgery imeni A.N. Bakulev; Armen Artavazdovich **Bunyatyán** and Renata Nikolayevna **Lebedeva**, doctors of medical sciences, department leaders, USSR Academy of Medical Sciences All-Union Scientific Center for Surgery, Boris Vladimirovich **Shabalkin**, doctor of medical sciences, chief scientific associate at the same scientific center; Toomas-Andres Aleksandrovich **Sulling**, doctor of medical sciences, department head, Tartu State University Scientific Research Institute for General and Molecular Pathology; Algimantas-Ionas Mikolovich **Martsinkavichyus**, USSR Academy of Medical Sciences corresponding member, department head, Vilnius State University imeni V. Kapsukas; Yevgeniy Vasilyevich **Kolesov**, doctor of medical sciences, department head, Dnepropetrovsk Medical Institute; Vladimir Petrovich **Demikhov**, doctor of biological sciences, former laboratory leader, Moscow City Scientific Research Institute for Emergency Aid imeni N.V. Sklifosovskiy; and Marat Dmitriyevich **Knyazev**, doctor of medical sciences—for the development and application in clinical practice of methods for the surgical treatment of ischemic heart diseases.

9. Boris Alekseyevich **Chumachenko**, doctor of technical sciences, department head, International Scientific Research Institute for Problems of Management, work manager, Vyacheslav Vasilyevich **Marchenko**, doctor of geological and mineralogical sciences, and Yevgeniy Petrovich **Vlasov**, candidate of technical sciences, laboratory heads; Eduard Alekseyevich **Nemirovskiy**, candidate of technical sciences, senior scientific associate, and Vladimir Alekseyevich **Yakovlev**, candidate of technical sciences, leading engineer, associates at the same institute; Aleksandr Anatolyevich **Sapunkov**, candidate of geological and mineralogical sciences, department head, All-Union Scientific Research Institute for the Geology of Foreign Countries; Lev Moiseyevich **Natapov**, candidate of geological and mineralogical sciences, chief geologist of expedition, Production Geological Association for Regional Study of the Geological Structure of the Country's Territory, Yuriy Nikolayevich **Spomior**, leading geologist on the same expedition; Vladimir Alekseyevich **Ivanov**, leading geologist of party, Berezovskiy Production Geological Association; Yuriy Konstantinovich **Bakhtadze**, chief of party, methodological expedition, GeSSR Administration of Geology, Bakhtang Irakliyevich **Lordkipanidze**, senior geophysicist of party for the same expedition; and Nikolay Vasilyevich **Mezhelevskiy**, candidate of geological and mineralogical sciences, administration chief, USSR Ministry of Geology—for developing an automated technology for predicting mineral resources and applying it in the national economy.

10. Ivan Mikhaylovich **Vikulin**, doctor of physical and mathematical sciences, department head, Odessa Electrotechnical Institute of Communications imeni A.S. Popov; Viktor Ivanovich **Murygin**, doctor of physical

and mathematical sciences, department head, Moscow Institute for Electronic Equipment, Leonid Stepanovich **Gasanov**, candidate of physical and mathematical sciences, senior scientific associate at the same institute; Konstantin Sergeyevich **Konstantinov**, department chief at a scientific research institute; Yuriy Ivanovich Kotov, general director of a production association; Boris Vladimirovich **Tkachev**, leading designer at the design bureau of the same association; Aleksandr Nikitich **Marchenko**, candidate of technical sciences, docent, Moscow Instrument Building Institute; Yuras Karlovich **Pozhele**, academician, laboratory head, LiSSR Academy of Sciences Institute for Semiconductor Physics, Ilya Saulovich **Levitas**, candidate of physical and mathematical sciences, senior scientific associate at the same institute; Eduard Konstantinovich **Sitnikov**, department head, GeSSR Academy of Sciences Special Design Bureau for Scientific Instrument Building; Vitaliy Ivanovich **Stafeyev**, doctor of physical and mathematical sciences, professor, Moscow Physical-Technical Institute; and Otar Kvirosiyevich **Khomeriki**, doctor of technical sciences, department head, Georgian Polytechnical Institute imeni V.I. Lenin—for researching the physical foundations for and developing and organizing series production of semiconducting magneto-controllable devices.

11. Mikhail Ilich **Berezinets**, Magadan Okrug administration chief, USSR Gosgortekhnadzor; Sergey Dmitriyevich **Viktorov**, doctor of technical sciences, head of laboratory, USSR Academy of Sciences Institute for Problems of the Comprehensive Development of Mineral Resources, Vladimir Ivanovich **Samoylov**, candidate of technical sciences, senior scientific associate at the same institute; Anatoliy Afanasyevich **Yegupov**, candidate of technical sciences, deputy director, All-Union Scientific Research Institute for Gold and Rare Metals, Viktor Grigoryevich **Sharude**, candidate of technical sciences, scientific associate at the same institute; Yevgeniy Anatolyevich **Kompaneytsev**, deputy chief of the Main Administration for Precious Metals and Diamonds under the USSR Council of Ministers, Albert Vasilyevich **Lobov** and Vasily Ignatyevich **Polutyuk**, administration chiefs of the same Main Administration; Aleksandr Aleksandrovich **Menshov** and Vladimir Fedorovich **Ushakov**, deputy general directors, Northeastern Gold Mining Production Association, Mikhail Pavlovich **Nikitenko**, mine deputy director at the same association; and Vladimir Mikhaylovich **Fedel**, mining explosives brigade leader, Susumanskiy Mining and Concentrating Combine—for creating and applying a technology for working frozen placer deposits using the simplest explosive substances in the mines of the northeastern USSR.

12. Sergey Stepanovich **Vyalov**, doctor of technical sciences, professor, Moscow Engineering-Construction Institute imeni V.V. Kuybyshev; Stanislav Eduardovich **Gorodetskiy**, candidate of technical sciences, senior scientific associate, Scientific Research Institute for Foundations and Underground Installations imeni N.M. Gershevanov; Boris Arnoldovich **Kartoziya**, doctor of

technical sciences, pro-rector, Moscow Mining Institute, Oleg Aleksandrovich Dolgov, candidate of technical sciences, sector leader at the same institute; Yuriy Konstantinovich Zaretskiy, doctor of technical sciences, laboratory head, "Gidroproyekt" All-Union Exploratory Design and Scientific Research Institute imeni S.Ya. Zhuk; Vladimir Prokofyevich Lukin, manager, and Igor Nikolayevich Frolov, chief engineer, employees of the "Shakhtspetsstroy" Trust, Igor Filippovich Los, chief of design office at the same trust, and Igor Vladimirovich Kleyev, former chief project engineer for the same design office; Anatoliy Vladimirovich Terekhov, shaft sinking brigade leader, Belgorod Construction Mine Shaft Sinking Administration; and Nikolay Grigoryevich Trupak, doctor of technical sciences—for developing and applying a technology for constructing mine shafts using the low-temperature freezing of rocks.

13. Grigory Lukich Serede, candidate of technical sciences, engineer, Ordzhonikidze Mining and Concentrating Combine, work manager, Aleksandr Yegorovich Dobrynin, director, Sergey Vasilyevich Lesnikov, chief engineer, and Aleksey Grigoryevich Nedra, brigade leader, all employees at the same combine; and Igor Konstantinovich Lavrinenko, candidate of technical sciences, deputy director, All-Union Scientific Research Institute for Water Supply, Sewers, Hydrotechnical Installations and Engineering Hydrogeology—for organizing the rational development of mineral resources and the recultivation of land at the manganese ore open pit mine of the Ordzhonikidze Mining and Concentrating Combine.

14. Noyan Akhmedyarovich Baytenev, doctor of technical sciences, and Vladillen Aleksandrovich Kozlov, candidate of technical sciences, both laboratory heads at the Kazakh SSR Academy of Sciences Institute of Metallurgy and Concentration; Vasily Yegorovich Lugovyy, chief engineer, Ust-Kamenogorsk Titanium-Magnesium Combine imeni 50th Anniversary of the October Revolution, Aleksandr Ivanovich Chikodanov, candidate of technical sciences, Vladimir Ivanovich Semichev and Aleksandr Stepanovich Yakutov, shop chiefs, Vyacheslav Semenovich Yatsura, deputy shop chief, Rafael Sultanovich Islamov, candidate of technical sciences, and Alekseyevich Kolyadzin, senior master, workers at the same combine; Artem Artemovich Salin, candidate of technical sciences, senior scientific associate, State Scientific Research and Design Institute for Concentrating Non-Ferrous Metal Ores; Yuriy Yuryevich Syvadoshch, candidate of technical sciences, laboratory head, All-Union Scientific Research and Design Institute for Titanium; and Mark Izraylevich Shapiro, engineer—for developing and applying resource-saving technological processes in titanium and magnesium production.

15. Aleksandr Ivanovich Klementyev, director, Lysvenskiy Metallurgical Plant, Yevgeniy Vasilyevich Ivanov, former chief engineer, Boris Aleksandrovich Shitov,

chief of the Central Plant Laboratory, Nina Kuzmichna Kosvintseva, laboratory chief, Aleksandr Yefimovich Krivosheyev, assistant shop chief, employees at the same plant; Aleksandr Isaakovich Vitkin, doctor of technical sciences, consultant, Central Scientific Research Institute for Ferrous Metallurgy imeni I.P. Bardin, Vladimir Andreyevich Paramonov, candidate of technical sciences, laboratory head, and Vadim Arkadyevich Litvinenko, candidate of technical sciences, senior scientific associate, employees at the same institute; Yuriy Petrovich Skorikov, chief project engineer, Urals State Institute for Designing Metallurgical Plants; Syuzana Ilinichna Levyanto, former senior scientific associate, All-Union Scientific Research Institute for the Canning and Vegetable-Drying Industry; Galina Matveyevna Florianovich, doctor of chemical sciences, leading scientific associate, Scientific Research Physical and Chemical Institute imeni L.Ya. Karpov; and Pavel Afanasyevich Mytsik, engineer—for developing and introducing technology for producing chrome-plated lacquered tin for the canning industry.

16. Anatoliy Mitrofanovich Sidiyakin, senior master, "Elektrostal" Electrometallurgical Plant imeni I.F. Tevosyan, Vera Mikhaylovna Shpitsberg, candidate of technical sciences, chief of laboratory, Robert Eduardovich Aseyev, candidate of technical sciences, shop chief, Viktor Petrovich Lavrentyev, master, and Oleg Simonovich Davydov, rolling press operator, employees at the same plant; Georgiy Semenovich Nikitin, doctor of technical sciences, professor, Moscow Higher Technical School imeni N.E. Bauman; Konstantin Petrovich Omelchuk, chief project designer, All-Union Scientific Research and Design Institute for Metallurgical Machine Building imeni A.I. Tselikov, Vasily Dmitriyevich Merzlyakov, candidate of technical sciences, senior scientific associate, Sergey Aleksandrovich Filatov and Anatoliy Yakovlevich Sapozhnikov, candidates of technical sciences, department heads, all associates at the same institute; and Vladimir Nikiforovich Zhuchin, doctor of technical sciences—for developing and applying a resource-saving combined process for the continuous casting and rolling of special steels and alloys.

III. For Textbooks

For Higher Educational Institutions

1. Boris Nikolayevich Arzamasov, doctor of technical sciences, department head, Moscow Higher Technical School imeni N.E. Bauman, Nikolay Mikhaylovich Ryzhov, doctor of technical sciences, Georgiy Fedorovich Kosolapov, Vera Ivanovna Makarova, Gerasim Gerasimovich Mukhin, Vera Ivanovna Silayeva, and Nina Vasilyevna Ulyanova, candidates of technical sciences, docents, associates at the same school, and Ivan Ivanovich Sidorin, doctor of technical sciences—for the textbook "Materialovedeniye" [Material Sciences], published in 1986 (second edition).

2. Iosif Semenovitch **Gonorovskiy**, doctor of technical sciences, former professor, Moscow Aviation Institute imeni Sergo Ordzhonikidze—for the textbook "*Radio-tekhnicheskiye Tsepi i Signaly*" [Radio Engineering Circuits and Signals], published in 1986 (fourth edition).

3. Vladimir Aleksandrovich **Meyer**, doctor of geological and mineralogical sciences, department head, Leningrad State University imeni A.A. Zhdanov, Petr Aleksandrovich **Vaganov**, doctor of geological and mineralogical sciences, docent at the same university—for the textbook "*Osnovy Yadernoy Geofiziki*" [Fundamentals of Nuclear Geophysics], published in 1985 (second edition).

4. Yevgeniy Mikhaylovich **Sergeyev**, academician, department head, Moscow State University imeni M.V. Lomonosov, Viktor Ivanovich **Osipov**, USSR Academy of Sciences corresponding member, Galina Andreyevna

Golodkovskiy, and Viktor Titovich **Trofimov**, doctors of geological and mineralogical sciences, also professors at Moscow State University; and Rem Sabirovich **Ziangirov**, doctor of geological and mineralogical sciences, head of department, Production and Scientific Research Institute for Engineering Research in Construction—for the textbook "*Gruntovedeniye*" [Earth Sciences], published in 1983 (fifth edition).

For Secondary Specialized Educational Institutions

Yuriy Vyacheslavovich **Vadetskiy**, doctor of technical sciences, deputy director, All-Union Scientific Research Institute for the Organization, Management and Economics of the Petroleum and Gas Industry—for the textbook "*Bureniye Neftyanykh i Gazovykh Skvazhin*" [Drilling Oil and Gas Wells], published in 1985 (fifth edition).

Science & Technology Officials Comment on New Financing Policies

GKNT Official on Subsidies

18140092 Tashkent EKONOMIKA I ZHIZN in Russian
No 9, Sep 88 pp 37-40

[Article by A. Kazakov, deputy chief of the Administration of the Improvement of the Economic Mechanism of the USSR GKNT [State Committee for Science and Technology], under the rubric "The Key Task Is Introduction": "No Subsidies, No Indulgences"; first six paragraphs are EKONOMIKA I ZHIZN introduction]

[Text] Science and Cost Accounting

In the revolutionary transformations of our society and in the plans of restructuring an enormous role is being assigned to science. A new mechanism of intensive management in this sphere is being assembled: a new system of the remuneration of labor has been introduced, new organizational forms, for example, inter-branch scientific technical complexes, have appeared, and the changeover of science to full cost accounting and self-financing is being carried out. All this should contribute to its progressive development and to the overcoming of the phenomena of stagnation, which have formed in it.

Just recently the very idea that the scientific sector of social production can be changed over to cost accounting and that the scientific organization can be regarded as a commodity producer, seemed all but fantastic to many people. Today this is a reality. The changeover of sectorial science to full cost accounting and self-financing should already be in full swing. But so far only about a third of the scientific collectives of the republic have accomplished such a changeover. "We believe that this process will take place with somewhat greater difficulty than in other sectors of the national economy"—that is how Deputy Chairman of the Uzbek SSR Council of Ministers V.V. Sudarenkov defined, with all frankness, the urgency of the problems that are arising during the restructuring of science, when opening a seminar-conference, which was held in Tashkent and was devoted to questions of the changeover of scientific organizations to full cost accounting and self-financing. What questions worry today the immediate participants in this process, what answers they can suggest to each other, what still has to be thought about, and what still has to be changed—the selection of materials offered below, which, we hope, will help those who in the immediate future should begin working under full cost accounting and self-financing (let us recall that as of early 1989 all sectorial institutes should work that way), is about this.

In the next issues the editorial board proposes to continue the discussion on this theme.

Whereas the interrelations between the institute and the enterprise have changed, and it is impossible not to notice this, the interrelations with the superior organ—the ministry—have undergone practically no changes. More than 80 percent of the executives of institutes believe that the administrative methods of management have not weakened under the new conditions of management.

A. Kazakov, deputy chief of the Administration of the Improvement of the Economic Mechanism of the USSR State Committee for Science and Technology, defined this problem as one of the main ones:

The changeover of science to cost accounting and self-financing is an integral component of the radical economic reform. In contrast to previous documents, which were devoted to questions of the increase of the effectiveness of scientific research developments and only lightly powder individual shortcomings, the decree of the CPSU Central Committee and the USSR Council of Ministers "On the Changeover of Scientific Organizations to Full Cost Accounting and Self-Financing" suggests the restructuring of the work of scientific collectives on a completely different fundamental basis.

First of all the system of planning is being changed. In contrast to the system, which was previously in effect, when a quite large number of indicators—from 10 to 20—were established for the scientific collective, beginning with the amount of work being performed and ending, say, with limits on business trips, under the new conditions of management the decision has been made not to establish any indicators from above. The amount of work is defined as the sum of the contracts, which have been concluded in scientific organizations on the basis of their own initiative, on the basis of socialist enterprise. The only standard, if it is possible to call it this, which is specified for the scientific collective from above, is its basis themes, or the range of operations.

Standard planning is being introduced for the first time in the practice of the work of scientific organizations. Eight standards are being established. Three of them are interrelations with the budget. These are the standard of the deduction from the profit (today it comes to approximately 2 percent), the standard of the fee for fixed production capital (1 percent), and the standard of the fee for manpower resources (it depends, just as in industry, on the region—200-300 rubles per person). Standards of the deduction for the centralized fund, standards of the formation of the economic stimulation fund, the material incentive fund, and the fund for scientific, technical, and social development, and, finally, the standard of the formation of the wage fund and the standard of currency deductions have also been established.

The price is the next element which has become today a part of the practice of the work of scientific collectives. Since the status of a commodity is being conferred here on the result of scientific labor, the commodity should

also have a price. This price is a contract price. It is the prerogative of the two contracting parties. Now this is one of the key, most sore questions of the specific practice of changing science over to cost accounting.

A new thing in the work of institutes is the existence of a profit. Not the profit, which we previously had, as the excess of revenues over spending. It is a question of the real difference between the contract price and the expenditures on the performance of a specific scientific research job. The profit under present conditions is one of the main sources of the scientific, technical, and social development of the collective.

The changeover to special-purpose financing is being accomplished. In contrast to the system previously in effect, when the institute and its labor collective were the object of financing, now the contract, the specific theme, and the specific development are established by the object of financing. It is impossible not to say that now in science its own source of financing of its own reserve themes is appearing. Under the new conditions of management it is permitted to allocate the funds for scientific, technical, and social development for the financing of research and reserve operations. The crediting of amortization for fixed production capital has been introduced in scientific collectives.

As is known, never before did science answer with the ruble for the results of its labor. For the first time in the practice of the work of scientific collectives the material liability of science for the results and the quality of its labor has been introduced.

The opportunity of obtaining currency assets, which, moreover, are directly connected with the result of activity, has been afforded institutes.

The simple enumeration of all the innovations in itself already testifies to the problems, with which scientific collectives have now been faced. Having comprehended everything new, to implement it is, of course, a task which requires time and hard work. Nevertheless, science has been working under the new conditions of management for several months, and although this time is obviously insufficient to draw any profound conclusions and to make any serious generalizations, today it is already possible to share several observations.

The first thing that is conspicuous is the fact that the interrelations of the performer and client of the scientific and technical product are changing. Whereas previously the contract campaign, as a rule, took place formally, to a certain degree even equably, the present campaign has shown the increased activity of science and its interest in finding a direct client and in concluding a contract with him. Enterprises, by paying for developments from their own pocket, have begun to make different, I would say, increased demands on the quality of future developments. Both the performers and the clients are treating more seriously the content of the contract: they are

analyzing it more thoroughly, are approaching in a more exacting manner the formulation of the thematic plan of the institute, and are eliminating from it the developments, which might not interest a specific client.

It must be said that gradually—this is also a very important thing—the psychology of scientific collectives themselves is being transformed. Perhaps, it is a little too early to speak of a radical change, but the fact that customary notions are showing signs of cracking, is quite obvious. I have in mind the psychology of the guaranteed 100-percent financing (as it was previously) of the work of the institute. Today scientific collectives are understanding more and more clearly that there will be no subsidies and no indulgences in science. The institute, which has not taken on an amount of contracts, or else the subdivision, which has not taken on this amount, should either revise its direction of work or be eliminated—this conforms to the principles of cost accounting. In this connection a certain differentiation, a stratification within collectives is occurring in science—why, this is natural, moreover, these processes will grow with each day.

At first, at the first stage of the transition period, there were many fears that science "would not take on" contracts and would remain in a void. These fears were not born out. We analyzed the work of 120 institutes of the country—of them 98 provided themselves with contracts at the level of 100 percent and more. But it is impossible not to see that at the institutes the contracts were taken on to a certain degree due to subdivisions which work well. There were also those, for whose proposals there was no demand. In other words, cost accounting showed who is who and what is what.

Under the new conditions of management at scientific institutes the activity, which is aimed at the saving of material resources, has been stepped up. The introduction of a fee for capital made it incumbent to get rid of unnecessary equipment. The aspiration to save on overhead expenses is conspicuous.

Whereas the interrelations between the institute and the enterprise have changed, and it is impossible not to notice this, the interrelations with the superior organ—the ministry—have undergone practically no changes. The old supply orders in practice have found only a new form, and then not always and not everywhere. Neither increased demandingness on oneself nor the aspiration to assume additional duties—none of this is being felt. Therefore, the logic of cost accounting also requires a certain displacement of assets in favor of the direct clients, in favor of specific enterprises and industrial associations. We together with the State Planning Committee have to reconsider the ratio of centralized and noncentralized sources of financing in science. It is necessary to concentrate a large amount of assets in the hands of industrial enterprises and associations. Wherever this has already been done, cost accounting has come fully into its rights. This work will continue until

1990. Strict limits of the financing of science by means of centralized sources have been established for ministries, and the share of this financing over the remaining years of the five-year plan will decrease. What is meant is the amount of assets, which will be directly in the hands of ministries. It is clear that here it is necessary to keep very strict track of the structure of centralized funds and, first of all, to see to it that the money, which has been allocated for the financing of basic research, work connected with intersectorial problems, and so on, would not come from centralized funds. Nearly a third of the assets should be allocated for the financing of precisely this work and this research.

It must be said that the new conditions of management have stimulated the development of the procedure of internal cost accounting in scientific collectives. More than half of the 120 surveyed scientific organizations have already approved this procedure. It would be possible to list a large number of changes and innovations, which have appeared in the work of science, and to show its increased activity, awakened enterprise, and so on. But, apparently, it is more important to direct attention to the problems, which are arising under the new conditions of management, and to outline means of their solution.

One of the main ones, in the opinion of the majority, is the preservation of the command style on the part of ministries and departments. More than 80 percent of the executives of institutes believe that the administrative methods of management have not weakened under the new conditions of management. There are a great number of examples of this. I myself had occasion to visit a design bureau of reinforcement making in Leningrad and to familiarize myself with the order of the minister, who asked, or rather, ordered this design bureau to develop in January very complex items for a very crucial job, while the order arrived in February. We are no longer amazed at such turns of the command-headquarters methods of management. Another thing is frightening. In this order there is not a line about who should finance this work, the sources of its financing are not indicated, who needs it, who its client is, and so on. It is the same style—fulfill and report, but it is not clear by means of what assets and resources. Apparently, this is a problem which it is impossible to solve in 1 hour, it requires a certain time and daily painstaking work. The solution lies in the strict observance of the terms of the decree of the CPSU Central Committee and the USSR Council of Ministers on the changeover of science to cost accounting, in which it is clearly recorded that every commission, every assignment, and every instruction should be fulfilled by the institute only on a contractual basis. And here very much depends on the labor collectives themselves of scientific organizations. It is possible to solve this problem only jointly, by proceeding in two directions: we from above, and labor collectives from below.

Very many difficulties are arising for scientific institutions in determining the contract price. It would seem that in the party and government decisions it is quite

unequivocally stated that the prices for scientific developments are the prerogative of the two contracting parties and should be determined only by them; no third party has the right under the new conditions of management to interfere in the contractual relations of the client and the performer. But, unfortunately, practice has shown that the superior organ is interfering, and quite actively. It is very important to specify one's position on this question—one of the key questions—of the changeover to cost accounting and self-financing.

When it was finally decided that the result of scientific labor is acquiring the status of a commodity, a problem immediately arose—how to appraise this commodity, what to regard as the starting point for determining the price for the scientific and technical product. Here two points of view clashed.

The advocates of one propose to take the beaten path, which all our industry took, basing themselves first of all on the expenditure approach.

The other is the position of the State Committee for Science and Technology, and it found reflection in the decree of the CPSU Central Committee and the USSR Council of Ministers—it poses the question as follows: when determining the price for the scientific and technical product it is necessary to proceed only from the result, that is, from the ultimate impact, from the real profit, which the implementation of an innovation in the practice of the national economy yields.

What are the arguments in favor of the second point of view? First of all the determination of the price subject to the end result makes it possible to form the cost accounting system in science on the basis of simple common sense. Must it be said that we have had both previously and today enough trivial jobs of all kinds, which no one needs, and all the same they are financed. Among the people they say about them: "to pound water in a mortar (that is, to beat the air)." If you take our position, such jobs, naturally, will not have any price. If there is no end result, there are no prices, no contract, no object of the contract. If you accept the expenditure approach, the contract takes place—for there are expenditures on the "mortar" and on the "water," there are labor expenditures, and so on. The ministry will invent the standard of profitability—here you go, the contract is ready, and everyone will deal with the formation of these labor expenditures. Everything will be here, starting with the contract and ending with the profit, but there will not be the main thing—an end result.

It would seem that it is clear—it is necessary to proceed from the utility, from the profit, which the implementation of a scientific and technical development provides at the specific enterprise, at the specific kolkhoz, sovkhaz, and so on. But today these principles are often emasculated, inasmuch as a large number of ministries in their methods recommendations also recorded the fact that the price for the scientific and technical product

is determined subject to the expenditures. While wherever expenditures appear, of course, the monitoring of these expenditures is needed and accordingly some method is needed. This is from where the requests on the part of the number of scientific research organizations to give them all kinds of recommendations, instructions, and so on come.

When the price for the scientific and technical product is determined exclusively on the basis of what real benefit it has been to the national economy, here, so it seems to me, no methods are needed. And the overwhelming majority of managers of scientific collectives (more than 75 percent are such) share this point of view. In the end, if some regulation—how, say, to divide the sum of the obtained impact, the sum of the specific profit, and so forth—is actually needed in this area, we are ready once again to seek the advice of the scientific community. We are ready to have a discussion in this direction. But the expenditure approach to pricing in science, in our opinion, is entirely unacceptable: it cancels out all cost accounting.

Now, about the wage; its own difficulties also exist here. Several ministries adhered not entirely precisely to our recommendations on the determination of the standards of the wage and did not establish these standards clearly enough. The following question also arose: Does one compute the wage fund from the amount of completed work or as a percentage of the amount of performed work? The wage fund is determined as a percentage of the amount of performed work. This question was settled quite unequivocally by the instructions which were issued today by the USSR State Bank.

The main difficulty, which has to be faced during the changeover of science to cost accounting, is, first of all, the inadequate preparedness of personnel. The analysis of the activity of scientific collectives under the new conditions of management showed that often even specialists, who work at the institutes, are poorly acquainted with the most important standard documents. It must be emphasized that these are not enforceable enactments, but simply explanations of central economic ministries and departments on how to organize the work of science under the new conditions of management. Ministries are delivering these documents extremely slowly to the scientific organizations that are subordinate to them—as a result, very many questions of different kinds are arising. How is this situation to be corrected? First of all, apparently, it is necessary to use more efficiently the traditional forms of the improvement of skills through sectorial institutes for the improvement of skills. At the same time we have organized consulting centers. At present three such centers are operating in Moscow, they exist in Kiev, Leningrad, Odessa, and Novosibirsk. It seems that it is also necessary to establish something similar in the Central Asian region.

In conclusion I would like to say that whereas sectorial science is already getting used to cost accounting relations and is already organizing its work in the new way,

this task is only now arising fully for academic and VUZ science, as well as for the nonproduction sphere. Their changeover to the new conditions of management will be over next year. Here, of course, its own specific nature and its own difficulties exist. Therefore, it is necessary already today to prepare for this with all seriousness.

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Institute Director on Conflicting Regulations
18140092 Tashkent EKONOMIKA I ZHIZN in Russian
No 9, Sep 88 pp 41-43

[Article by A. Ganiyev, director of the UzNIIPgradostroitelstva, under the rubric "The Key Task Is Introduction": "We are Learning to Earn"; first paragraph is EKONOMIKA I ZHIZN introduction]

[Text] Under the conditions of the mass lack of economic knowledge the word "likbez" [likvidatsiya bezgramotnosti (the elimination of illiteracy)] has turned into "lekbez" [likvidatsiya ekonomicheskoy bezgramotnosti], that is, the elimination of economic illiteracy. We should constantly learn, asserts A. Ganiyev, director of the UzNIIPgradostroitelstva, while sharing the experience of settling several questions which arise during the changeover of scientific organizations to full cost accounting.

We began the changeover to full cost accounting with an expert evaluation of the amounts of work, which had been proposed for 1988. And we had to revise this figure upward by threefold! Only then did we, at last, reach the amounts, which would enable us actually to settle the questions of our own social and production development. But we had to add neither more nor less than 1.2 million rubles.

This is the first conclusion, to which we came: so that cost accounting would not become an illusion, it is necessary to begin with the determination of the threshold of its "viability" and to keep rigidly from slipping down from it. The second is the necessity of the regular analysis of the economic results of management and the identification of the reserves of the increase of profitability and the reduction of unnecessary expenditures. For the present our economic services are engaging only in the technical work on the reporting of the planning and production indicators to the subdivisions, in accounting, and in reporting.

Work in accordance with contracts is the key to the solution of the set of problems, which in the practice of yesterday seemed insurmountable. The main thing is that it is enabling us to make up the thematic plan ourselves in accordance with the address lists of construction. That is, we now have a clear picture of the territories, where the interests of both union and republic ministries and of oblast soviet executive committees have been taken into account and coordinated. This to a

great degree helped us to boost the efficiency of work. Thus, in 1988 we ensured the construction of 1.1 million square meters of housing, a third more than in past years.

But, in all fairness, the contractual system requires critical analysis and is raising for us a number of new questions.

In the actions of departments there are many contradictions, which are complicating our work, which is difficult as it is. In November in the USSR State Committee for Construction Affairs there was a conference, at which a group of directors of prominent institutes made a single request—to no longer publish any departmental documents on the changeover to full cost accounting and self-financing. There is one main decree and that is enough. For experience had already shown that departmental addenda can so confuse the issue that interpretations and reinterpretations will ruin as a result the entire initial intention. At least four documents, which arrived at planning institutes, in practice contradicted each other.

Here is an example. In March there was the instruction of the Ministry of Finance, which categorically prohibited the entry in the receipts of the accounts payable of the client, that is, our hard-earned money for the products that were produced by us in past years, in accordance with the certificates, the receipt of which the client confirmed to us by signing.

A second example. While preparing for the changeover to the new system, we saved on the wage in the hope that we would be permitted to count what was saved toward the unified fund of 1988. Initially this question was simply not settled, and suddenly in March a special commission permitted us to credit toward 1988 the saving of the wage fund, true, only within the limits of the above-plan profit. But why was this not spoken about earlier?

Or another one. Having cut off previously the accounts payable, which for our institute came to 1.2 million rubles, quite unexpectedly the USSR State Committee for Construction Affairs and the USSR Promstroybank in late March made the decision that it is possible to credit the advances of the client to our receipts and revenue. Where is the logic? Where is the consistency?

The departmental addenda and changes in practice had the result that the overwhelming majority of planning institutes during the first quarter did not cope with the fulfillment of their plans.

I would like to say a few words about the two models of cost accounting. Before choosing, we "drew" for ourselves these models in all the details, took lessons with our leading specialists, and drew our own conclusions.

They are as follows: today the first model, which, perhaps, also settles the questions of the formation of the economic stimulation fund and fund of social and production development of the collective, in practice never settles the question of increasing the wage fund. In other words, the first model actually is not yet full cost accounting. The second model settles the question completely, makes cost accounting real, and takes in, finally, elements of the expenditure mechanism.

And that is why we agreed to the second model. This question was discussed at the first meetings of the councils of labor collectives, which were elected here, this became a baptism of fire for them.

I want to share several thoughts which, I believe, may be useful for many scientific collectives which are changing over to full cost accounting.

The first. When changing over to full cost accounting, especially in accordance with the second model, in my opinion, the minimum amounts of profitability for planning institute should be in the range of 18-19 percent. A smaller profitability can in practice simply undermine the changeover to the new system.

The second. It is necessary to examine closely unfinished production. We, for example, when we prepared for the changeover to full cost accounting, had attained a level of unfinished production of 20 percent. But this figure proved to be low. Now, according to our calculations, the minimum figure of unfinished production with respect to planning institutes at the moment of the changeover should be not less than 30 percent.

The third. We began to refrain from concluding contracts with clients, who did not guarantee us payments, have accounts payable, or did not pay us for the certificates of "unfinished production." For, if the client does not have a stable financial status, in my opinion, during the 1st year of the changeover it is simply dangerous to conclude a contract with him. Although wherever this concerned the support of the housing program, we agreed to exceptions and concluded contracts even in case of the most serious financial status. Apparently, it is necessary change the client, especially the one who "sits" on the budget, over immediately to the new methods of management, so that he simply would have accounts for the payment of an advance and for the 100-percent payment for our contracts.

The fourth. It is no secret that we all have broken machines which still "hang" on the balance sheet. The amortization deductions from this and other inoperative equipment are yielding such great losses (especially with respect to the payments for fixed capital) that it is necessary to revise completely the existing composition of fixed capital and to resolutely write off all the ballast.

And, finally, the primary thing is internal cost accounting. Three tables, which were drawn up according to the principle "compare yourself," now hang in the vestibule of the institute. This is the so-called consolidated personal account of the institute. All the divisions are displayed on it in accordance with the full second model of cost accounting. That is, each division now knows precisely and clearly how many proceeds it should obtain, what material expenditures it has, what the gross revenue should be, how much it should pay the ministry and to the budget for fixed capital and for manpower resources, what the cost accounting revenue is, what conditional fund of social development and the development of science and technology it has, and, finally, what the unified fund of the remuneration of labor is. There are also such personal accounts in the divisions, while one copy is also available without fail in the accounting office.

In early May, when we were settling the question of material stimulation, a noteworthy fact occurred here. What had previously never happened, occurred. Several divisions, which had a positive balance with respect to the unified fund of the remuneration of labor, as an exception transferred for a month a portion of their wage fund to the divisions which did not have this fund. The debt will be repaid to them later—after the delivery of products.

We are constantly searching. Under the conditions of the mass lack of economic knowledge the word "likbez" has turned into "lekbez," that is, the elimination of economic illiteracy. So it is—we should constantly learn.

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Chief Engineer on Personnel Aspects

18140092 Tashkent *EKONOMIKA I ZHIZN* in Russian
No 9, Sep 88 pp 43-44

[Article by M. Shainskiy, chief engineer of the Tekhnolog Scientific Production Association, under the rubric "The Key Task Is Introduction": "How the 'Brain Trust' Was Established"; first paragraph is *EKONOMIKA I ZHIZN* introduction]

[Text] One of the priority tasks when changing over to full cost accounting and self-financing is the overall increase of the skills of personnel. M. Shainskiy, chief engineering of the Tekhnolog Scientific Production Association, tells how this and other problems were solved at it.

The Tekhnolog Scientific Production Association has been operating under the conditions of self-financing, self-support [samookupayemost], and cost accounting since 1 January of this year.

With what did we begin? With the teaching of the basic principles of economics under the conditions of cost accounting to all the personnel of the association. Lessons were organized at three levels. The first level is for the management staff, to which the managers of the association, their deputies, and the managers of divisions belong. The second level is economists of the subdivisions and personnel of the planning services, the accounting office, and labor and wages. The third level is performers, designers, process engineers, and workers. During the lessons we strove to make each person aware of the entire group of problems, with which the scientific production association is faced in its daily work. A program was developed, not only theoretical lessons, but also lessons in the form of business games, during which computer hardware was used, were conducted. Thus we tried to raise the overall level of the economic competence and technological literacy of the collective.

Another task, on which we worked simultaneously and which we now consider very important for success in work, is not simply the explanation of the bases of self-financing, but also the overall increase of the skill of personnel. This task, even if it is not directly connected with self-financing, concerns it indirectly.

The point is that the changeover to cost accounting of planning and design and technological organizations is causing the natural increase of the cost of products. But then the profit of the plants, with which we are working in accordance with contracts, for the present is not increasing. They are simply incapable of paying us at the new prices. Under these conditions enterprises are trying to be more assiduous and are ceasing to order ordinary, routine work from us, performing it on their own. That is, now we are forced, and this is entirely justified, to engage exclusively in operations, which would be beyond the power of enterprises themselves with respect to the technical level and degree of complexity.

The accomplishment of this key task also required of us the sharp increase of the skills of our own personnel. We organized a system of the training of people in all advanced directions of microprocessor and computer technology and information science and in the fundamentals of flexible production systems. A university for leading specialists of the association was organized. Twice a week for 2-2.5 hours 340 people engaged in the study of these subjects. Each course was designed for 144 hours. Instruction lasted approximately 6-7 months, then there were practical lessons. Then examinations were taken. In this way the "brain trust" of our leading specialists was established. While the marks, which they got on the examinations, were to a certain degree a passing grade for the increase of salaries and for promotion, which, in turn, guaranteed their serious attitude toward this question.

Special-purpose courses in computer-aided design systems and in the increase of the level of patent and license work and a large number of others were also organized.

As a result practically all the engineering and technical personnel were encompassed by both technical and economic training.

Another important problem of ours is the increase of the labor productivity of designers. The traditional "technology" of designing, when the designer sat at a board and they kept an eye on him, so that he would not lose even 5 minutes, in the past did not yield great successes. We acquired several sets of domestic aids for computer-aided design, automated workstations of the designer and process engineer, and 20 Hungarian personal computers and now have the opportunity to switch to computer-aided design systems.

Several such systems are already in operation. These are pattern cutting, automatic die forging, and a number of others. For comparison, previously the division made up to 30 designers could design in a month no more than 30-40, at most 50 dies. Now two designers, two programmers, and one equipment adjuster will cope with this task with the aid of automated equipment.

Work is under way on the transfer to personal computers of all possible engineering calculations, including economic calculations. For the increase of the labor productivity of workers we are carrying out the reequipment of production and are introducing machine tools with program control, machining centers, and advanced methods of laser and plasma machining. Thus, in practice in 2 years we introduced only 70 units of equipment with program control. And now one worker attends simultaneously two or three machine tools. All this made it possible to boost labor productivity at the association appreciably and to increase drastically the amount of work. The figures testify to this—as compared with the end of 1986 we have reduced the staff by 200, while the amounts of work here increased by nearly 30 percent during just the first half of this year.

All the designers and process engineers have begun to work on a brigade contract. We began to introduce this contract in 1982 as an experiment, being one of the first in the country. And the 1st year of work showed that the productivity of designers under the conditions of the brigade contract increased by 30-40 percent, moreover, the collectives themselves got rid of incapable and lazy workers. Everything is being standardized, all objects have a specific—according to the price lists of the ministry—labor intensiveness, while in the brigade each person performs a job in accordance with his abilities most efficiently. Today 100 percent of the designers and process engineers here are working in this way, which along with the solution of a number of social problems made it possible to reduce drastically the turnover of personnel. Whereas in 1981 it came to 17 percent, last year it came to 3.2 percent, while this year, we hope, it will be in the range of 2.5 percent. Productivity increased

by 50 percent and more—wages were increased, people know for what they are receiving money. Moreover, the output per worker here significantly leads the increase of the wage.

During the preparation for cost accounting jointly with the ministry we worked out all the standards. Now they have been brought up to condition and approved and, therefore, are not creating today any difficulties in the normal operation of the association.

Prices are now formed on a contractual basis. But before switching to this principle, we determined the level of profitability for each job. Thus, if it surpasses the highest world level, its profitability comes to 60 percent, if it conforms to the world level, it comes to 30 percent, and if it is lower, it comes to 10 percent. We have reported such indicators to the divisions as mandatory indicators.

Now about several newly arisen difficulties. We reoriented the collective toward the fulfillment of difficult jobs, since, as has already been stated, enterprises under the new conditions prefer to perform simple jobs themselves. They switched to the designing of flexible modules and appeared on the foreign market. And it turned out that a number of even medium-size enterprises do not have the opportunity to fill serious expensive orders, which would enable them to reduce the production cost and to guarantee quality.

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Institute Director on Wage Criteria

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No 9, Sep 88 pp 44-45

[Article by A. Stepchenko, director of the Central Asian Scientific Research and Planning Institute of the Petroleum Industry, under the rubric "The Key Task Is Introduction": "What Salary Is To Be Established?"; first paragraph is EKONOMIKA I ZHIZN introduction]

[Text] How is the labor contribution to science to be determined? What are the criteria of its evaluation? A. Stepchenko, director of the Central Asian Scientific Research and Planning Institute of the Petroleum Institute, reflects on these and other questions, which have been posed by the changeover to cost accounting.

We all use the word "self-financing," apparently, while not yet completely realizing that today at many scientific research and planning organizations it is a question for the present of cost accounting and self-support [samookupayemost]. For the present we are merely compensating ourselves and are deriving the profit, which is being created against our future reserve and against our future accumulations, from which we will subsequently finance ourselves.

Cost accounting has raised many questions for us. At long last it has been said distinctly and clearly to us: the scientific product is a commodity. It is difficult to become accustomed to this immediately, but precisely this is the basis of restructuring in science. Therefore, one of the key features in our work on the basis of cost accounting is the feature of the determination of the meaning, amount, and correctness of the contract price. I believe that, apparently, the contract price in each specific case should be examined both from the standpoint of the use value and from the standpoint of the expenditure value.

Another question is: we say that it is necessary to pay people for the labor contribution—What is the labor contribution to science? How is it to be weighed, how is it to be determined? For there is very much subjectivism here. For example, I, the director, have been given the right to establish salaries. The "spread" of the remuneration of scientists is quite great. Assume that the head of a laboratory, a candidate of sciences, can receive from 250 to 400 rubles. What salary is to be established for him? Is it 250, 300, 350, or 400 rubles? How is one to determine what he deserves? Of course, public organizations should be extensively enlisted in this and, what is the primary thing, some criteria, which make it possible to evaluate as objectively as possible the contribution of one worker or another, should be specified.

We made the following attempt—to formulate specific criteria of salaries within the established "spread." From what are they formed?

Here there are both the significance of the theme, on which the scientist is working, and the contribution during the preceding period, particularly during the preceding year—how much of a confirmed impact was obtained from his developments, inventions, efficiency proposals, recommendations, and so on, as well as his preparedness and length of service in science teaching and production. Another of the criteria is when a person last studied and increased his skills, in other words, whether he is today at the crest of fresh ideas about his work or has fallen hopelessly behind. There is also one controversial thing here—Is it necessary to take into account the sociopolitical activity of a person? Some people say: money is not paid for public work. Today we do not pay volunteers and any of those who perform public work during nonworking time. It seems to me that within the salary it is all the same necessary to give the activist a raise of 5-10 rubles.

We came to the agreement that the established salaries are in effect for 1 year, a year after the regular certifications the commission reviews them: if a person "sat it out," does not work, and does not think, the public "weighs" his work and says—your work is not worth 300 rubles, your work is already worth only 270 rubles.

I am not asserting that our version is the most successful one, perhaps someone will propose a better one, but for the present we are using our own and see: the activity and the output of the people, who have understood that their contribution is evaluated according to some effective criteria, have increased.

Now about the increments for high indicators in labor and for the performance of especially difficult, critical jobs. Although I am not an advocate of working in accordance with instructions, at times it is necessary, apparently, to have some sound recommendations. We have been debating for half a year—What are difficult and critical jobs? How is this to be determined? Especially as clients today do not order noncritical jobs from us.

A few words about the relations with the client. There is a demand for our products, we have concluded contracts for 3.3 million rubles, which is 600,000 rubles more than the amount of last year. But it must be admitted that the authority and reputation of science are at such a level that the client is not always confident that he will derive the guaranteed economic impact. He is quite skeptical about the very work "guaranteed." When we submit a good idea and say—believe me, you will get 3 million rubles, give me 10 percent so that I would implement this idea, he replies—but suddenly there will not be 3 million and I will lose 300,000. Such skepticism is explicable: over the years the opinion formed that our science half consists of loafers. It is necessary to overcome this opinion. Only by good work will we be able to convince the client that it makes sense to conduct a business partnership with us.

At present we serve three associations which are located in the region—the Uzbek Petroleum Association, the Tajik Petroleum Association, and the Kirghiz Petroleum Association. It turned out that we are subordinate to the Uzbek Petroleum Association, but serve three republics. This is creating certain difficulties in interrelations with clients in Tajikistan and Kirghizia. I believe that it would be advisable to establish a unified regional complex—the Central Asian Petroleum Association, for the Central Asian Coal Association, the Central Asian Gas Production Association, and so on are operating. Then we would have a common client. I believe that the establishment of a scientific production association would serve the improvement of the interrelations and the coordination of the interests of the client and the performer. Only then could we build the bridge, which we have been trying for so many years to erect between science and production.

A. Saydazov, chief of the subdivision of science and the training of scientific personnel of the Uzbek SSR State Planning Committee, and I. Shakirova and N. Shamukhamedov, staff members of the journal, prepared the selection.

Sagdeyev Interviewed on Science, Military Policies

18140098 Moscow NEW TIMES in English
No 47, 1988 pp 26-28

[Academician Roald Sagdeyev interviewed by our special correspondent Mark Levin]

[Text]Sagdeyev: Strategic changes should be made today in our model of socialism, and our doctrine should look ahead to the more distant future. During this period we should be able to bring about a fundamental improvement in our country and show that our model of socialism is effective.

Politicians, economists and sociologists are thinking about this issue today. That should also be the goal of perestroika in our fundamental and applied sciences. This perestroika is being widely discussed. However, real changes so far are negligible. Fortunately, people can now talk freely about their needs. Glasnost, a certain degree of openness, and some elements of democracy have become a reality, though we still have to learn how to use them.

NEW TIMES: Can strategic and current objectives be linked in some way or other?

Sagdeyev: That would be a good thing. Perhaps it explains why long-term and pressing tasks are often lumped together, and scientists are often rebuked for allegedly doing nothing to help improve the quality of life as soon as possible.

NEW TIMES: Is it a just rebuke?

Sagdeyev: It is explained, in my opinion, by the lack of understanding between groups of people working for the successful attainment of strategic and of current goals. Perhaps science is not needed to alter the traditional course of our country's economy. It would simply be enough to make the course sensible.

NEW TIMES: ...and straightforward...

Sagdeyev: And straightforward. We must abandon the conventional but absurd and at times stupid ways and means of developing our economy and society as a whole. Vladimir Kabaidze's speech at the 19th National Party Conference is significant in this respect. "Why don't you help us?" this distinguished industrial manager asked scientists. He cited South Korea as an example. There is not a single research institute there, but industry is growing so rapidly that South Korea has become one of the ten states that can dictate their terms on the world high-tech market.

Perhaps our science will be unable to guarantee such rapid growth in a short time. In fact, the above-mentioned strategic objectives are not within the province of large-scale research. The aim of large-scale research is to

build a reserve that will feed our country and its economy with fundamental ideas for a long time to come. These ideas should form the basis for the long-term development of our society.

By declaring that science is under an obligation to society, people often cite examples from everyday life. The facts speak for themselves, of course. But they also show that science itself was a victim of the same excessive bureaucratization that afflicted our society as a whole. On the other hand, Soviet science, subservient to higher authorities, was often guided by political considerations of a transient character and, taking advantage of its great authority, approved worthless, even dangerous projects. We might recall here decisions to "remake nature" that have already caused immense damage to our ecology.

NEW TIMES: You've said that by virtue of its authority science approved unscientific decisions. And what about the honor and conscience of the scientists themselves?

Sagdeyev: You known, the degeneration of moral standards took place quietly and imperceptibly. The ruling elite only promoted "scientists" they approved of, those opportunists who, prompted by careerism, were prepared to endorse any decision. Special vacancies were created for these "scientists" during elections to the Academy. True, thanks to the principled and vigorous stand of genuine scientists, the promotion of such careerists was sometimes checked. But that only happened when scandalous facts came into the open. On the whole, moral standards were gradually eroded in our science, and its standards naturally declined.

NEW TIMES: This process had an adverse effect on young scientists, didn't it? Weren't their moral standards also eroded? Scientists who began their careers in the stagnation period will continue to work in their fields in the early 21st century, and our future depends on them to a great extent. Is there any cause for hope then?

Sagdeyev: It seems to me that young scientists, and young people generally, do not now have much faith in their elders and senior colleagues or in the possibility of really creative work. However, they learn to adapt to the new situation, and before long office seekers appear among young people. They often start their careers in Young Communist League, trade union and Party organizations, gradually becoming heads of small and then big departments. This process is being widely discussed now, and the incipient renewal of Soviet society concerns everyone, including young scientists.

NEW TIMES: Speaking at the National Party Conference, Vladimir Kabaidze, whom you've cited above, asked what hundreds of thousands of scientists were doing in Moscow?

Sagdeyev: I think the number should be made more exact. Hundreds of thousands working in the field of science constitute the personnel of all the institutes, organizations and enterprises associated with research and development. To my mind, at least 70 per cent of them are employed in institutes and factories that are considered special and the veil of secrecy over them has not yet been lifted by glasnost and democracy. One of the main dangers lies here, because the degeneration of our science began for the most part in an area where glasnost and democracy are minimal. It is also the area where the biggest investment is made.

The question of glasnost in investment and expenditure has been decided in principle. Mikhail Gorbachev firmly declared some time ago that the military budget and military expenditure would be made known to the public. It will then be able to judge whether the huge military spending is necessary, to what extent it serves to strengthen the defensive capacity of the Soviet Union and the socialist community as a whole, and to what extent it facilitates the growth of arbitrariness and careerism. The objective laws of development of military-industrial complexes in capitalist states obviously operate in the Soviet Union too. Otherwise, they would not be objective.

NEW TIMES: It appears that concern for defence potential favored the spread of arbitrariness, excessive organization and bureaucracy in science. All this was explained by the desire to strengthen the country's defence at any cost.

Sagdeyev: It should be said in all fairness that the desire to strengthen the country's defence was justified by necessity, as we had more than a few enemies at one time. For a long time the international situation did not permit the Soviet Union and other socialist countries to bring about a complete unilateral disarmament. That is obvious. Nevertheless, it is difficult even to imagine the degree of arbitrariness in the field we are talking about. Today we are discussing arbitrariness in spheres open for all to see, such as industry and agriculture. We should therefore be especially concerned about the possibility of arbitrariness in a sphere closed to the public.

NEW TIMES: How can such a possibility be countered?

Sagdeyev: To the extent that the regime of state secret allows—and this regime is certainly impossible to ignore—unbiased experts could be allowed to verify projects envisaged by one or other item of the military budget, up to the examination of research and development work in a given field.

This is not an entirely new idea. We can judge and even qualify as dangerous some new projects in capitalist states. This means they have a certain degree of openness in the military sphere, whereas in our country openness is simply nonexistent. It is hardly surprising that thanks

to the atmosphere of openness quite a number of very important strategic concepts limiting the unbridled growth of military-industrial complexes have appeared in the West.

We are proud of the role we played in the conclusion of the ABM Treaty. It is perhaps the most important accord restricting the buildup of strategic armaments. But it should be admitted that it was American experts who first advanced the concept that strategic defence could prove a destabilizing factor and, moreover, a highly dangerous one. So I think what is needed above all in this sphere is openness, within reasonable limits, of course.

If we want to ensure such openness, it is necessary to enhance the role of parliament and carry out the proposals and measures advanced at the 19th Party Conference, in particular, the measures to increase the role of the Soviets and the proposals to change the role of the Supreme Soviet. This will enable competent parliamentarians to head the work of examining military activity. It will be a concrete example of glasnost and democracy.

NEW TIMES: When you spoke at the Party Conference about the need to replace high-ranking officials in their posts every ten years, I thought you were jeopardizing your own chances, because there was no guarantee that you would remain director of the Institute of Space Research. But subsequent events showed that you did not try to retain this post and conceded it to your colleague.

Sagdeyev: At the Party Conference I proposed to go even farther: not only to limit the term of service in high office to ten years, but also to count in the previous term of such work. My proposal was not accepted. I submit to party democracy and will abide by the conference's decision, but I had every right to resign from the post of director I had held for 15 years. I think that in research institutes, especially in such a large institute as ours, 15 years of work in the same office is a pretty long term. A new man will certainly see more than a few shortcomings. If my successor decides to readjust the work of the institute, I am prepared to give him immediate help.

My long-time desire was to work on some extremely interesting scientific problems, not as an organizer but as a scientist.

NEW TIMES: Conducting space research for so many years, you naturally realized that space science is closely linked with military problems and that the results of your space exploration will not necessarily make people happier. On the contrary, they could lead to the extinction of mankind in space wars. So the question posed by Einstein stood before you more poignantly. How did you answer it for yourself?

Sagdeyev: I realized, of course, that space technology, many of its components in any case, can be used unchanged for military purposes. The booster vehicles,

electronic devices and computers used in space exploration can also be used for space spying. I think every scientist should answer this question for himself in a new way of his own.

I consider myself lucky, because almost all my work—not only in space research, but also my previous research in plasma physics and controlled thermonuclear fusion—was connected with international projects. Our work favors the consolidation of scientists, not confrontation between them, though we live in very different states. It is the principle of open laboratories Mikhail Gorbachev spoke about two years ago, a system that helps remove suspicion between people from countries with different social systems. I could watch how international cooperation between specialists in the above-mentioned fields was developing.

NEW TIMES: What impelled you to write a letter to Moscow News calling on the supreme authorities to restore justice with regard to Academician Sakharov and return his awards to him?

Sagdeyev: Many years ago, as a student writing my graduation thesis, I happened to do practical work in the organization where the theoretical department was headed by Academician Sakharov. My subject concerned models of intra-stellar processes such as energy transfer and radiation. You know, this circumstance made me think that the scientists who played a decisive part in securing the defence parity of our country at a crucial moment had not forgotten about peaceful research either. They affectively coped with their formidable task and perhaps saved the world from another global conflict.

Sakharov, Zeldovich and other scientists from that organization have become authorities not only in the military-related fields of science, but also in astrophysics and cosmology. I think that the moral charge I received then influenced my subsequent life. As a physicist, I had an opportunity later on to watch how Andrei Sakharov progressed in his scientific work. One of his works dealt with controlled thermonuclear fusion. Together with Academician Tamm, he to some extent anticipated the idea of Tokamaks, in which I became directly involved as well. I also deeply share Andrei Sakharov's views on the arms race and other issues of concern to all mankind. His life as not been an easy one....

NEW TIMES: ...and the circumstances were not always auspicious for him...

Sagdeyev: That's right. The government did well to allow Sakharov to return from his exile in Gorky. But reservations existed and justice had not yet been fully restored. Reflecting on this unhappy state of affairs, I decided to write a letter to Moscow News: the public should know

of the reservations concerning Academician Sakharov. All his awards have now been returned to him, and he has been elected to the Presidium of the Academy of Sciences.

NEW TIMES: And it was Roald Sagdeyev who put forward Andrei Sakharov's candidature instead of his own. Thank you for the interview.

Paton Interview on Human Factor in Science
18140097 Moscow PRAVDA in Russian 28 Nov 88 p 3

[Interview with President of the Ukrainian SSR Academy of Sciences Academician B. Paton by PRAVDA correspondent M. Odinets (Kiev): "The Creator Against the Bureaucrat. President of the Ukrainian SSR Academy of Sciences B. Paton on the Human Factor in Science"; date and occasion not given; first paragraph is PRAVDA introduction]

[Text] **PRAVDA:** The most significant reserves, which, unfortunately, are being used for the present entirely inadequately due to the numerous stratifications, which science acquired during the era of the domination of the administrative command system, are connected with the human factor. They, of course, are convenient for bureaucrats and various figures near science, but place the researcher himself in a position, which in no way is conducive either to fruitful labor in his immediate job or to the stepping up of efforts, which are aimed at the achievement by our science of a new qualitative state.

Paton: These problems were the topic of a concerned discussion at a recently held session of the General Assembly of the USSR Academy of Sciences. Their successful solution requires the radical change of the activity of academic institutes, and first of all the planning, financing, and organization of basic research. The changes should ensure the efficient selection of the most urgent scientific themes and the support of creative collectives, which are capable of achieving breakthroughs to the leading levels of modern science and technology.

PRAVDA: To all appearances, the competitive system of the selection of themes is a very important and promising thing for the firm establishment of the principle of the competitiveness of scientists and the increase of their responsibility.

Paton: Of course. Unfortunately, we ignored them too long. Let us be frank. The competitive principle blends poorly with the atmosphere of bureaucratic administration by mere decree, monopolism, and patronage. And if competitions were held, they often were emasculated so much that they turned into formal procedures, which resulted not in the stimulation, but in the simulation of creative activity.

Honest creative competition is a necessary interpretation of the process of democratization in the sphere of scientific research. However, the establishment of the priority of research subject to its scientific significance and national economic urgency on a competitive basis requires a strict system. The sound selection of the most significant works can be ensured only by serious scientific forecasts, open discussions, and, of course, objective evaluation.

In general the role of principled and competent evaluation is extremely important. This at times is the only means of opposing the voice of reason to libertarian pressure, departmental egotism, and, within collectives, the personal likes and dislikes of managers. But this sort of scientific activity in our country for the present, to put it mildly, is not held in high respect.

The questions of the remuneration of experts also need examination. Traditionally their labor was performed in our country essentially as a voluntary service, and if it was paid for, the payment was purely symbolic. This by no means contributed to the increase of the scientific level of and the adherence to principles in the evaluation.

Let us take for an example such an area as information science and information technologies, the development of which is of extremely great importance both for science proper and for all sectors of the national economy without exception. We have many achievements here, but, as several scientists in the West say not without reason, our science still remains uncomputerized. Therefore, regardless of the opinions of authoritative foreign experts it is hardly possible to regard the planning of research, which is oriented toward the elimination of our lag behind the world level, as a manifestation of concern about the saving of state money.

PRAVDA: Will not the implementation of the competitive selection of themes lead to the disintegration of some scientific collectives?

Paton: It is impossible to disregard such a prospect, although I do not believe that there will be too many insolvent collectives. But some of them, which lost long ago an interest in scientific research with all its thorns and deprivations and prefer to work endlessly the once found "vein of gold," will actually be faced with a dilemma—either to reject such stereotypes or to cease their existence. Let us not forget that "konkurs" [competition, contest] and "konkurentsia" [competition, rivalry] are words of the same root. While we lack precisely "konkurentsia," especially in the scientific area.

The shortage of healthy rivalry gives rise to apathy and indifference and leads to the decrease of responsibility not only for the efficiency of the use of allocated resources, but also for the fates of domestic science. Scientific parasitism, when a person, who calls himself a scientist, strives merely for the maximum benefits,

which are received from society, without being embarrassed at all by the fruitlessness of his theme, is the extreme manifestation of all this.

PRAVDA: Are the deep moral principles, ethics, and morality of the scientist, apparently, being affected by the modernization processes, to which restructuring has given life?

Paton: Certainly. I would say that first of all the deep meaning of restructuring also consists in the fact that the party appealed directly to the moral principles of man, which in the recent past were often ignored, or else were suppressed. If a new qualitative state is not realized by the people, it will also not be achieved by the country. The crux of all restructuring lies in this.

A new level of the state of research, highly efficient technologies, and high product quality will not come of themselves. Someone should generate daring ideas, rally a collective of like-minded people, assume responsibility for the end results, and, what is the main thing, work, work as if possessed, in a selfless manner.

Monopolism with its inherent unequal relations between the participants in scientific and technical cooperation is a relic of the era of stagnation, which had and, unfortunately, continues to have an extremely adverse influence on the development of our science. Its manifestations are many-sided. Capital investments and allocations, scientific information and foreign business trips, unique instruments and scarce reagents...can be the object of monopoly appropriation.

One of the manifestations of monopolism is the division of science into "capital" and "provincial" science. The consequences of this are the poor use in state plans of scientific research of the potential of republic academies, the inadequate representation of their scientists on the scientific councils for these programs, as well as the notorious "residual" principle in the supply of researchers. It is very important that the system of the competitive selection of themes and expert evaluations, which is now being introduced, would become a reliable counterbalance to the monopolistic trends at all levels of the hierarchical structures of the Academy of Sciences.

PRAVDA: Restructuring in science is, of course, also the restructuring of its management. What problems and difficulties turned out here to be unexpected?

Paton: The overall direction of the changes, which are already being implemented, is the substantial decentralization of management. Like, incidentally, everywhere, at our academy the center of all the work on restructuring has been transferred to the institutes, where, strictly speaking, science goes on. Such a line, as we are convinced, completely conforms to the party policy of the gradual democratization of Soviet society and makes it possible to realize to the maximum degree the creative

potentials of collectives. It will also have a positive effect on the activity of the presidium of the academy, which now can be concentrated to a greater extent on the accomplishment of the most important functions of an academywide nature and the strategic tasks of the development of scientific research. The arrangement, as you see, is quite simple and logical. However, here we had occasion to be faced with significant difficulties. We did not foresee several of them. We are speaking about the inertia of the bureaucratic style of management, but it is also necessary to realize that the bureaucratized style of subordination, when even what is the competence of an institution is not done without a document, without instructions from above, is just as inertial.

The changes in the life of institutes and the introduction in the research process of the spirit of debate and initiative in many respects depend on who heads the institute. And here we also had occasion to be faced with great difficulties, which we had not foreseen earlier. The "problem of the director," which illuminated the crisis of management and the unsuitability and fear of many of our venerable scientists to head creative collectives under the new conditions, arose. As we know, a similar picture is also being observed at other academies of sciences. The solution, apparently, consists in the significant increase of attention to the training of a capable reserve of management personnel and in the steadfast and consistent support of independent, truly resourceful people who long for changes.

PRAVDA: You have repeatedly voiced your opinion about the necessity of a vigorous influx of young people into science. What new opportunities for this were afforded during restructuring?

Paton: The decree on the annual 5-percent replacement of the staff of scientific institutions with young specialists, undoubtedly, is contributing to the expansion of the influx of young people to them. However, in my opinion, this document interprets the correct problem slightly rigidly. Five percent for each institute and every year. Try in this case to take into account the specific nature of the movement of personnel at various institutes and the internal needs of the replacement of collectives and to ensure continuity in case of their formation and development. And in time these problems form by no means uniformly. Apparently, here we have to finish thinking something out so that the implementation of the undoubtedly necessary processes of the replacement of personnel would not be accompanied by unnecessary haste and the same formalism, which gives rise to friction and conflicts.

It is much more difficult to ensure the proper quality of the fresh forces which are coming to our institutes. Here we will still have to do much work, in the closest contact with the higher school. But the essence of the present difficulties is that both the academy and higher educational institutions for the present are not capable of offering talented young specialists such conditions which

they are finding in the sectors of the national economy, not to mention cooperatives, which are gaining strength. "The sciences cherish youth and give delight to the old...." M.V. Lomonosov, apparently, thoroughly understood the conditions which were necessary so that the Russian land would give birth to "its own Platos and quick-witted Newtons." We thus far have succeeded more with regard to "delight to the old." It is necessary to solve all these problems.

Reasons for Soviet S&T Lag Summarized
18140087 Moscow SOTSIALISTICHESKAYA
INDUSTRIYA in Russian 18 Oct 88 pp 2, 3

[Interview by V. Volnov with Pavel Vasilyevich Volobuyev, USSR Academy of Sciences corresponding member, under the "Science to Set Science in Motion" rubric: "If We Look the Truth in the Eyes. Lack of Morality Threatens Stagnation"; first paragraph is SOTSIALISTICHESKAYA INDUSTRIYA introduction. Passages in italics as published]

[Text] *Over the decades, we have been convinced that our "great" science holds a leading position in the world. If it were not for difficulties with application, with the implementation of bold ideas, then we would. However, a time of glasnost and sober evaluations has started. It turned out that even in basic research we lag in a number of leading areas. "Catching up" development has become predominant in our science and engineering. This severe conclusion was made at the 19th Party Conference. In Moscow today, the USSR Academy of Sciences General Meeting is beginning work to outline a program of actions, proceeding from the conference resolutions, and a way to increase science's contribution to restructuring. P. Volobuyev, USSR Academy of Sciences corresponding member and one of our leading science historians, considers those problems, which should be discussed at the meeting.*

P. V. Volobuyev: Science is one of the few sectors of activity in which scientists themselves evaluate the course and level of development. It would seem that society's trust should have engendered a high sense of responsibility and exigency towards oneself and others. However, an atmosphere of self-praise and complacency has set in here instead of these. This would have been understandable, to some extent, in the early 1960s, when we successfully solved the atomic problem, led in quantum electronics and were first to launch into space. However, even at that time the entire front of science had not been pulled up to a leading level here. Then the period of steady downward slipping began. Progress was slowed, even in areas where our scientists had traditionally led, for example, in "pure" mathematics.

Today, our strong lag behind the leading Western countries and Japan in information technology and information science, which have become the cutting edge of scientific and technical progress, causes particular alarm. Matters are no better in a number of areas of microelectronics, biotechnology and polymer chemistry, in which

we even risk entering the 21st century in a lagging position! Is this not why some scientists have begun to speak openly of a crisis in our science? The shortage of ideas threatens it. After all, even 2 decades ago our scientists, especially in theoretical fields, advanced just as many ideas, as in the United States.

The situation has reached the point that the party conference had to speak not of using accumulated, but of creating qualitatively new domestic scientific potential. What happened to the previous potential? Let us remember how proud we were to have more than a half-million doctors and candidates of science alone. We tried not to remember what their performance was like. Otherwise, we would have had to admit that, possessing one-fourth of all the scientific workers on the planet, we provide no more than 15 percent of scientific production and possibly even less, according to expert approximate estimates.

For comparison, I can recall that at the start of this century there were about five and a half thousand professors in Russia. Of them, only one-half worked in science. However, these men were titans of thought. They put Russian science on a level with the world. The scientific potential of pre-revolutionary Russia was not inferior to the potential of leading Western countries in terms of qualitative indicators. After October, when science had rid itself of bureaucratic ways and become self-managing, it began working at full force. If not for the mass repressions in the 1930s...

SOTSIALISTICHESKAYA INDUSTRIYA: Pavel Vasilyevich, does it seem to you that we have already started recalling these dark pages in the country's history intentionally? Compared to that which was done in the 1930s, our own shortcomings and errors seem trivial.

P. V. Volobuyev: The nightmares of the past must not be forgotten—otherwise they might be repeated. However, this is a special topic and I intended to speak only of science. Much of that which hinders it from moving forward today began in the 1930s, and strengthened its positions right up to the 1950s. Precisely then, the interference of the administrative-bureaucratic apparatus in scientific work was reinforced, and incompetence and conservative-ideological tendencies gained the upper hand. Entire fields were suffocated, not just in biology, but in other sciences as well.

Basic research was already inadequately financed at that time and talented scientists, who had worked on solving "abstract" problems, were deprived of support. The bureaucratization of the organizational structure itself of science took place. Even planning was converted into its antithesis. Many studies which had been included in the plan, but had lost their topicality, were nonetheless continued either for the sake of fulfilling the plan or because the interests of a certain group of scientists or one scientific research institute or another backed them. Science also did not escape percentomania and the love of victorious reports.

It is not worth laboring under delusions: this entire bureaucratic bacchanalia is flourishing even now, putting the ordinary scientist in a dependent position and strengthening the power of bureaucrats over science. The multi-stage procedure for the examination and approval of projects, the need to petition for numerous permissions, often for trifling reasons, and the endless criticisms of finished projects constantly remind us of this. What is the practice of expert analysis worth, besides being specially contrived to delay publications and rid them of novelty? This serves someone's purpose—it removes personal responsibility. Yet, after all, none of this existed in the first years after the revolution, when relations in science were structured on trust in scientists and on their independence.

SOTSIALISTICHESKAYA INDUSTRIYA: Three decades have passed since the cult of personality was dethroned. Is it appropriate to refer to it, when Japan managed to rise up as a leader of scientific and technical progress in the same period? Finally, what has kept our scientists from making a breakthrough in the past 3-5 years?

P. V. Volobuyev: We have received a terrible inheritance. The rigidity of organizational forms, weak technical equipment of our institutes, low results of research—all these are not the worst of the problems. In science, where the scientist's talent, bold thought and intuition determines everything, moral atmosphere is one of the decisive conditions. The bureaucracy in science has tried to poison precisely this. One way to do this is to intentionally substitute genuine criteria for success with false ones.

For example, everyone knows that the whole world judges the significance of a scientist's work according to the so-called index of citation—the number of references to it in other publications. We have intentionally ignored this indicator, apparently because on the average it is lower by a factor of 6-8, than in the United States. Yet, after all, 2 decades ago we only lagged behind the Americans by a factor of two.

Here, it is unacceptable to compare the novelty and promise of the studies being conducted with the world level, with similar developments abroad. As if science could develop in isolation, we devised our own kind of evaluation scale, among which one can find... the opinions of authorities, of the minister, and even of society. We even use this scale when awarding the Lenin and State Prizes. Is this not why their prestige has declined? Moreover, it is known that the extensive list of winners often includes people who have no direct relation to scientific or technical innovations, for which they have been bestowed high awards! Cases of awarding prizes for notoriously poor work are also common knowledge.

Even the great Lobachevskiy said that "science must be built on a firm foundation of morality." Unfortunately, many people have appeared in our midst who have scorned this rule. We continually encounter cases of

open careerism, indifference, using the work of subordinate scientific workers, and even direct appropriation of results achieved by them. Worst of all, a corresponding member at the academy's Urals Department, whose "brain trust" not only prepares articles and books, but also prepared a newspaper interview for him, was the talk of the town.

Consider a problem such as scientific schools, without which the successful development of science is inconceivable. Instead, some kinds of pseudo-patriarchal groups began appearing, for which students and followers are chosen not according to abilities, but according to complaisance, connections and personal devotion. Some scientific leaders, including at Moscow State University, have mastered a fairly unique method for training graduate students: they accustom their students to cleaning their apartments, walking their dogs, and doing their shopping. Degrees and titles, scarcely received for successes in a scientific field, serve as a reward for this groveling. Thus, clans, a scientific mafia, are being formed. The healthy spirit of competition and domination of knowledge and talent are disappearing from science.

SOTSIALISTICHESKAYA INDUSTRIYA: It seems to me that we have come up to the problem of cadres. Therefore, I will permit myself an immodest question: what do you think about the age limitations on both the right to be elected an academy member, and on holding leading posts, which have been introduced in the USSR Academy of Sciences?

P. V. Volobuyev: The violation of the normal correlation between different generations is one of the main reasons contributing to stagnation. The point is not only the aging of scientific cadres—we have lost virtually an entire generation of scientists in the 40-55 year old age group, who were not allowed to develop at their most productive age. In our academy, the last leading figures in fields such as mechanics, mathematics and physics will be leaving the scientific scene in upcoming years. Meanwhile, we see no equivalent replacements for them in the next scientific generation.

In this regard, it would be appropriate to recall the results of a study conducted on science after World War II. A special commission was supposed to ascertain why the country had been defeated. As one of the reasons, it cited the fact that French professors retire at age 70-75, yet in Germany they retire 10 years earlier. However, this conclusion was not based on the fact that the elders interfered in the development of science—the productivity of the new generations of scientists was not properly utilized. In other words, the age restrictions which we have introduced should contribute to an influx of young people. Yet, this is also a problem.

For example, it worries me that recently people with average capabilities, as well as those without any at all, often go into science. The "questionnaire" system of

selecting cadres, which functions to this day, is particularly at fault in this. Because of it, for example, the ranks of graduate students are frequently replenished not with scientifically gifted people, but with so-called social leaders. A student who has published his work in an academic journal or received an author's certificate for an invention will barely make it into graduate school, if the secretary of the department's Komsomol organization lays claim to the position.

I am not opposed to social leaders, and even value their organizational abilities highly. Possibly, they are irreplaceable in production and trade union work. However, what does this have to do with science? There is a multitude of mediocrities among these candidates and doctors of sciences. Hence, the surplus of so-called organizers of science. In other words, a surplus of people who strive only to hold leading posts. So, it turns out that while knowledge and titles exist, generators of new ideas and world-class scientists are becoming ever fewer.

Consider the statistics on Nobel Prizes, even though this indicator suffers from well-known subjectivity. Yet, nonetheless... During the postwar years, Soviet scientists received six of them, but Americans received more than 60. However, the saddest thing is that of the six works which were recognized, five had been done in pre-war times, and the sixth—in the early 1950s! Of course, it is possible to refer to the obsolete equipment in our laboratories and stingy investments in basic science. However, let us look the truth in the eyes: have we always done and are we doing everything we can to bring only talented people into science?

Although I myself devoted about 10 years to party and soviet work, I still cannot remain silent about one outcome of the era of stagnation. Since the 1960s, a "mass campaign" for scientific degrees and titles—for party, soviet and ministerial officials—began in science. Most of them scarcely strengthened science in the qualitative sense. However, a surplus was then created of claimants to the role of "leader" of science, a surplus of organizers and managers. Right now, something similar is occurring in connection with the reduction of the ministry apparatus. Apparently, if we want to raise the level of our science, we should put serious restrictions on this.

In my opinion, finding talented and young people and involving them in science is the main task which faces us. It is time to reject romantic concepts about the limitlessness of talents in our people. In my opinion, those who think that the immense number of war victims, the losses among the most active part of the population as a result of mass repressions and, finally, the consequences of alcoholism, have undermined our gene pool are correct. The system of secondary and higher education also took "no few pains" in this direction, with its orientation toward the universal averaging and leveling of the individual, toward the fettering of

initiative and creative principles. We have essentially deprived the growing generation of opportunities to display talent. What has become of the wonder-kids, the brilliant little boys?

SOTSIALISTICHESKAYA INDUSTRIYA: However, I see no reasons that would hinder the influx of cadres to science, if science opens its doors to them, and the more so, if science also begins showing concern for growth in their numbers.

P. V. Volobuyev: Apparently, you simply do not suspect the complications that await us. I fear that we will inevitably have to undergo an intensification of the struggle surrounding talented people for science, literature, art and management. We should understand that talented people must not only be sought out, but also supported and defended in every possible way. It must be confessed, great creative individuals may end up in an openly hostile atmosphere in some of our institutes. Their successes, like a troublesome element, can be turned into a kind of red flag for a backwards collective.

On the other hand, I am sure that we will not solve the problem of the "quality" of scientific cadres and the sharp increase in creative results, without changing views about the significance of their labor. Only the publicists at *LITERATURNAYA GAZETA* managed, in some years, to be indignant regarding the exorbitant earnings of our scientists. In actual fact, in terms of payment for scientific labor (and this is in the age of the scientific and technical revolution!) we are far behind not only the developed capitalist and majority of socialist, but also many developing countries. Young scientific workers are in a particularly difficult position: their earnings are even lower than the average for the country.

Should one be surprised by the fact that the influx of creative young people into science is so weak? Like it or not, one will be forced to agree that in the eyes of the new generation of scientists neither the pathos of selflessness, the joy of scientific creativity, nor some ideological motive can compensate for poverty of existence. He who hopes for a radical breakthrough in science without great changes in the payment for scientists' labor is, willingly or unwillingly, a prisoner of self-deception. It is finally time to renounce the bureaucratic fear of overpaying for creative labor, particularly for discoveries and inventions.

Of course, the prestige of a scientist's labor is not only determined by wages. However, we are doing everything, as if on purpose, to undermine the situation in other areas as well. Thus, for example, our party raykoms have become accustomed to viewing scientific research institutes and design bureaus as a reliable source of manpower for construction projects, vegetable depots and "sponsorship assistance" of kolkhozes. Yet, no one is asking himself the question: what kind of costs does this cause for science? I am personally familiar with cases in which a young physicist, constantly recruited first for constructing an olympic stable, then for repairing a

pioneer camp, then harvesting potatoes, was unable to prepare his research results for publication in time. A similar solution of the same problem was soon published in an American physics journal.

I do not intend to dispute this opinion, for it is true: there is little ballast in our scientific research institutes. To put it simply, there are idlers. However, after all, idlers will be idlers anywhere. They also know how to shirk participating in "sponsorship aid." Scientific associates, particularly those working in the priority areas of scientific and technical progress, should be freed of any kind of compulsory labor once and for all.

SOTSIALISTICHESKAYA INDUSTRIYA: I do not want to argue about how much this proposal conforms to the standards of social justice. The problem lies elsewhere: neither high wages, nor freedom "from potatoes" will replace knowledge, purposefulness and a bent for analysis and making general conclusions. Where can we find such people?

P. V. Volobuyev: You have answered your own question: the successes of science begin in the VUZ, with the education of a talented generation. Unfortunately, the ban on holding two jobs has led to the fact that our leading scientists, including academicians and corresponding members, have been "excommunicated" from the VUZ lecture halls for many years. Even now, returning to the VUZ is fraught with all sorts of obstacles. After all, when I was a student, academy scientists not only taught classes, but they themselves singled out the most capable students, those with a gift for scientific creativity, in the instruction process. They invited these students to become graduate students or to work. In my opinion, the higher schools should be restructured precisely thus, with the aim of training cadres for science.

One cannot help but remember the age-old tradition of Russian science: after graduating from a university, graduates who were to be readied for a professorship were sent abroad for field work. The majority of outstanding Russian scientists took this course. This tradition was also maintained in the first years of Soviet power. For example, P. Kapitsa worked with E. Rezerford, and A. Ioffe—with V. Rentgen. This field work was extremely useful: informal scientific ties sprang up, it was possible to get necessary information from the primary source, and the opportunity was granted to work in leading laboratories for a while. It seems that a similar practice should be revived, without fail.

It is finally time to realize that the world scientific community is developing rapidly due to an intensive exchange of information. Yet, here the hard currency limits for purchasing foreign scientific journals are reduced from year to year. In the 1920s and early 1930s, the country was immeasurably more impoverished, yet needs for scientific and technical literature were almost entirely satisfied. Incidentally, obstacles to publishing

our articles abroad are also being maintained, apparently because of bureaucratic prejudices. It would also be good if the registration of trips abroad were simplified!

SOTSIALISTICHESKAYA INDUSTRIYA: Pavel Vasilyevich, we have been living under the banner of restructuring for more than 3 years. Do you think that it has changed anything in science? Or are additional measures still necessary?

P. V. Volobuyev: It seems to me that restructuring has affected science, but not particularly profoundly for the time being. Democratic principles, glasnost and openness are entering our life slowly. Yet, it is hard to count on the "scientific estates," which some institutes, departments and laboratories have turned into, once again becoming creative collectives without them. Meanwhile, a rapid growth in creative activity, the animation of discussions, and the equal struggle of scientific ideas and opinions is also unseen. Many have simply become used to this. For others, it is easier thus to preserve their own monopoly positions in a given area of science.

In trying to change the course of events, the new leadership of the Academy of Sciences has adopted a number of resolutions aimed at strengthening the role of our departments and at expanding democratic principles. However, somehow in real life they are turning into half-measures. Apparently, we must all still recognize that in an atmosphere of bureaucratic asphyxiation and official regulation there can be neither great science, great literature, nor great art, for the main thing—freedom of scientific creativity, fearless exploration and a devotion to truth and truth alone—is being extinguished.

We still have to create this atmosphere, perhaps at the cost of much effort and expense. I understand that a large number of very urgent problems, awaiting immediate solution, accumulated during the years of stagnation in the country. Among them, the most important is raising the living standard of our people: it is finally time to give the people, first to undergo and much-suffering, a taste of the fruits of contemporary civilization. Nonetheless, we must take rapid and comprehensive steps to ensure the outstripping development of our science. The future of socialism in our country, our national survival and the fate of peace throughout the world depend on this.

Joint Committee To Assess Damage Caused by Lysenkoism

*18140105 Moscow NEW TIMES in English
No 45, Nov 88 pp 40-42*

[Interview with Doctor of Chemistry Alexei Shamin by NEW TIMES observer Lev Yelin: "The Lysenko Phenomenon"; first two paragraphs are NEW TIMES introduction]

[Text] In May of this year, a joint decision of the USSR Academy of Sciences, the Academy of Medical Sciences, and the Agricultural Academy set up a committee to

study the history of genetics in the Soviet Union. One of the tasks of the committee is to assess the damage that "People's Academician" Lysenko and his henchmen inflicted on Soviet science.

Deputy Chairman of the Committee, Doctor of Chemistry Alexei Shamin spoke of some of the Committee's findings to NEW TIMES observer Lev Yelin.

NEW TIMES: Why has the committee been set up today, 25 years after Lysenko's downfall? Was it the wish of the Academies to fill in the blank spots in their history in the wake of the general tendency, or are there more profound reasons?

A. Shamin: The reasons are numerous... We must tell the whole truth of the conditions under which genetics and biology in general have developed in this country. It's time we gave a clear-cut answer: was the Lysenko phenomenon an isolated occurrence, or is it typical of the Soviet science in general? It is imperative that we should reveal not only the scientific, but also the political, economic and social prerequisites that made possible Lysenko's dominance in science. Our task is not just to analyze the past; we want to make sure that this past is not worming its way into the present and will not be possible in future...

NEW TIMES: Hence my first question—what helped Lysenko get to the top?

A. Shamin: Here I'd like to say that Lysenko had a precursor—Academician Williams, from whom he borrowed many of his infamous methods of running down his scientific rivals. Lysenko first appeared in the late 1920s, when Williams was already demanding capital punishment for those who dared pursue theories different from his own, even without criticizing Williams himself, as was the case with A. Doyarenko. After Lysenko had secured his position, he joined forces with Williams: the very term "agrobiology" was born of this alliance.

However, the main thing is that in the late 1920s and early 1930s the Lysenko phenomenon was vastly assisted by the confluence of several political, economic and social factors. Our press is now giving extensive coverage to the grim political situation at the time. Economic conditions were no better: the crop failures of the late 1920s had been exacerbated by the grave immediate consequences of the collectivization drive, and the country was experiencing food shortages. The switch-over from small-scale commodity production to large collective farms required a new farming technique. In this context, anyone who offered new methods and pledged to boost output by introducing new varieties of plants and more productive livestock breeds evidently stood to gain, and was given priority. Lysenko emerged as a talented, energetic expert from the faraway southern

Azerbaijan, always prepared to offer breathtaking perspectives. All that earned him the support of serious scientists, including Vavilov...

NEW TIMES: Still, the decisive factor in Lysenko's rise must have been support at the top. The history of this country knows of many cases where the leadership seized at any innovation promising immediate profit without thinking twice about longer-term consequences.

A. Shamin: We tend to simplify the Lysenko phenomenon, saying it was an offshoot of the personality cult, or that Lysenko himself enjoyed the favour of Stalin and successive People's Commissars for Agriculture. Behind Lysenko there were certain interest groups, first of all practical agriculturists, who badly needed state-of-the-art techniques. They believed in Lysenko; he had made a brilliant career; corresponding member of the Agricultural Academy, Academician, President of the Academy. They sincerely believed that results would not be slow in coming.

NEW TIMES: Could you remind our readers of one of Lysenko's "curative" measures?

A. Shamin: In the late 1930s, the People's Commissariat for Agriculture put forward the idea of an integrated seed-farming system. This system was a priority task, pivotal for the development of agriculture. A special committee headed by Vavilov was set up, and Vavilov propounded a brilliant and practicable programme. By that time, however, Lysenko had become powerful enough to dissolve the Vavilov committee, declare its programme invalid and advance a methodology of his own. The implementation of the Lysenko scheme resulted in the virtual destruction of seed-farming in this country. What Lysenko offered seemed attractive—he spoke of adapting some varieties of plant through changing heredity. This scheme forced agriculturists into the illusory belief that they were capable of tackling the problem on their own, without a centralized programme. On the other hand, the nation's leadership indulged in the idea that a very costly seed-farming system, requiring rigid control, was not really necessary, since matters could take care of themselves. The idea was attractive—and disastrous.

Another classic example of Lysenko's no less destructive activities was his campaign against maize inbreed-hybrids which, when introduced in the United States, yielded a 30 percent increase in grain output, amounting in the mid-50s to some 15 billion pounds. (A Russian unit of weight equal to about 36.11 pounds.) Even this year we purchased grain from these hybrids in the United States...

NEW TIMES: The appeal of such "practical" slogans could have weakened with time, and by the mid-30s Lysenko was already trying to identify scientific opposition with ideological and philosophical deviation. "The Party principle" in science became an instrument of

repression, and "dissident" scientists were labeled counterrevolutionaries. The division of science (and not just science) into "ours" and "alien," to which we have unfortunately become accustomed, proved fertile soil for bloody speculations...

A. Shamin: "We have grown accustomed..." In fact, comparisons between Soviet and "bourgeois" science originated in the philosophical discussions of the 20s, but Lysenko's sinister part was in the fact that he spared no effort to make this comparison seem natural and to bring ideology to science. Scientific criteria were replaced by ideological ones...

NEW TIMES: By the 1940s Lysenko had defeated his opponents. What price did the Soviet science pay for this "victory"?

A. Shamin: Lysenko's "victory" was built on administrative and Party leverage, which meant arrest and death for many...

By the 1940s he had no opponent of the scale of Vavilov or Koltsov, who founded the Institute of Experimental Biology and was its first director. Neither did he fear any attacks "from the flank." Irreparable damage had been inflicted on agricultural economics by the annihilation of Chayanov and his school; advocates of mathematical methods in ecology had been routed as a result of the victimization of Stanchinsky, one of the founding fathers of modern ecology, and the dismissal of Nemchinov (an outstanding economist and statistician) from the office of President of the Timiryazev Farming Academy; agronomy was destroyed after Tulaikov's arrest and execution by firing squad and the death of Pryanishnikov.

The principal damage perpetrated by Lysenko and his henchmen must be recognized in the destruction of the Soviet school of genetics, the termination of promising scientific studies and the closure of a number of research centres. The development of anthropogenetics and medical genetics in this country was halted, as was that of some branches of experimental and theoretical biology, which in the 50s gave world science such productive and promising disciplines as molecular biology and molecular genetics.

The teaching of biology also received a hard blow: fully aware that his doctrines would eventually be debunked by a new generation of well-educated biologists, even in the 30s Lysenko had demanded that "Mendelism-Morganism" be excluded from the biology syllabus.

Agriculture was crippled. Time, money and scientific effort were squandered on obviously useless research; unprofitable and unscientific recommendations and ventures were foisted on agriculture by decree, resulting in losses costing millions. Even today the nation's economy has not recovered from Lysenko's experiments.

NEW TIMES: After the war Lysenko's position was shaken. Biology journals showered criticism on him, while hopes of practical results grew threadbare. Finally, in 1948, Y. Zhdanov, Head of the Department of Science of the Party's Central Committee, and son of a prominent Stalinist ideologue, Politbureau Member A. Zhdanov, denounced the unscientific theories and baseless promises of the "People's Academician." Lysenko's world seemed about to come crashing down. However, he again managed to get off unscathed, and a new rise began. One more "Lysenko phenomenon"?

A. Shamin: There were a variety of reasons for the new rise, especially Stalin's support for Lysenko after the latter launched his complaint against Zhdanov, well aware of the fact that criticism was lethal for the structure he had created. Then came the notorious session of the Agricultural Academy of 31 July-7 August 1948, which excluded the remotest possibility of coexistence between conventional biology and the "Michurinist agrobiology" of Lysenko. In his concluding speech at the session Lysenko said: "I was asked about the attitude of the Party's Central Committee to my report. My answer is: the Central Committee has considered my report and approved it." On the same day PRAVDA carried Y. Zhdanov's letter to Stalin in which he retracted his criticism of Lysenko. All that implied that "Michurinist biology" had become the official Party line and that any deviations from it were incompatible with Party membership. Lysenko's theories were recognized everywhere, followed by mass dismissals. Reshuffles rocked the biology branch of the Academy of Sciences. Many laboratories were closed down, and a number of scientific schools ransacked.

In my opinion, Stalin supported Lysenko because of the need to maintain the state of affairs that had been reached before the war and was considerably damaged after it. Stalin did not want any drastic changes capable of undermining his authoritarian policies and administrative methods of management in any of branches of national life, science included. This was all the more so because by that time science had begun to turn into a powerful factor that could prove dangerous to the system (we had entered the Nuclear Age, and the role of science in the economy had grown substantially).

NEW TIMES: The Soviet nuclear programme evidently did not suffer from anything akin to the Lysenko phenomenon. In this case common sense prevailed...Still, the solution of agricultural problems in a country ravaged by war was no less important. In this case, why wasn't science protected?

A. Shamin: We hope to find answers in the work which still lies ahead. Much of the past remains unclear. What is clear though, is the fact that Stalin's support was decisive in Lysenko's career. However, this support wouldn't have been vouchsafed if Lysenko had not had certain influential social circles behind him. Unlike the 30s, when his ideas appealed to agronomists who were

begging for help, in the post-war years Lysenko was backed by a powerful group of bureaucrats which he himself had nurtured. To be more precise, this group had been generated by the Lysenko system. There were many people in the administrative and Party apparatus who owed their careers to Lysenko. These functionaries constituted the broth for Lysenko, they formed the "public opinion." In physics and chemistry, the positions of adherents of command methods in science were not as strong as in biology.

NEW TIMES: After Stalin's death, Khrushchev was courageous enough to denounce the personality cult from the rostrum of a Party congress. How could it be that Lysenko, a product of the personality cult, a model Stalinist, again fitted in well?

A. Shamin: It was not that simple at all...297 outstanding biologists, among them Corresponding Member of the Academy of Sciences Baranov and Academician Dubinin, wrote a letter calling on the Central Committee to end the Lysenko-generated system. There was another letter by 24 leading physicists, chemists and economists (Kapitsa, Sakharov, Tamm, Ginzburg, Landau and others). This valiant act did not go unnoticed, and Lysenko started to lose credibility. Soviet schools of genetics were gradually restored and research centres reopened. Then... It should be borne in mind that the situation in the country was virtually unchanged: agriculture needed to be rebuilt after the damage inflicted on it during the last years of Stalin's rule and as a result of the ill-considered moves of the new leadership. In this context, Khrushchev, guided by the as yet unclear personal motives, refused to dump Lysenko, supported him and allowed to express his ideas at the 20th Party Congress, which was unprecedented since Lysenko was not a party member. Fortunately, in Khrushchev's time Lysenko's comeback could not entail the annihilation of opponents or the ransacking of laboratories. On the contrary, new research centres continued to grow, and opposition to Lysenko increased. In 1956 Lysenko resigned from the office of President of the Agricultural Academy, but he was still supported at the top. It seems that in 1961 Lysenko used his influence to oust Nesmeyanov, the then President of the Academy of Sciences. In August 1961 he again became President of the Agricultural Academy, though on 5 April 1962, he resigned due to his "deteriorating state of health." Only in 1964, after the October plenary meeting of the CPSU Central Committee, the destroyed branches of Soviet biology were reinstated.

NEW TIMES: Little is known of Lysenko's life after that...

A. Shamin: After the plenary meeting Lysenko was dismissed from the post of Director of the Institute of Genetics, which he had occupied since the time of Vavilov's arrest in 1940. He remained head of a research

farm in Gorki Leninskie, near Moscow, where he continued his experiments, refusing to leave science for good. In 1976 Lysenko died...

NEW TIMES: Lysenko robbed Soviet science of 30 years of development, though not he alone of course, and under very specific conditions. Still, the phenomenon is alarming...

A. Shamin: Lysenko did colossal damage to Soviet science. In the 1920s and 1930s genetics in the Soviet Union was in the vanguard of science, and Soviet biology led the world. For example, we say that genetics was founded by Morgan. However, it was in Russia that Chetverikov created genetics of populations, which opened up perspectives for its practical application and was a powerful theory in itself. Many outstanding discoveries were made in the Soviet Union. The American scientist Muller started his research in genetics, which later won him the Nobel Prize, at the Koltsov institute...

Worst of all, Lysenko disrupted traditional agricultural practices, thus cancelling out the centuries-old experience of the Russian peasantry.

NEW TIMES: Today we speak much about openness in research work, about the need for closer scientific contacts. This could be another guarantee against the return of the Lysenko phenomenon. It is hardly, by the way, that Vavilov eagerly awaited the Seventh International Congress scheduled to take place in Moscow in 1937, and that Lysenko went out of his way to sabotage it...

A. Shamin: As I have already said, all discussions concerning biology and genetics were held among practitioners. For Vavilov and his supporters the Congress seemed the only way to address likeminded scientists, capable of understanding and duly appraising their efforts. The Congress could have provided Vavilov with the support of the world scientific community, but the Congress was rendered abortive and never took place. Some members of the organizing committee were arrested, and Lysenko exploited the fact to the full... However, after 1948 the Lysenkoites understood the importance of international contacts and started to make

their way into the world arena. Glushchenko, one of Lysenko's most ardent disciples, read his papers abroad to full houses. Students and scientists thronged to listen to him: for them Glushchenko's reports sounded as though someone had started to question the Copernican model of the world, defending that of Ptolemy before present-day congress of astronomers... This didn't prevent Glushchenko from interpreting it as an immense interest on the part of the Western scientific community in Lysenko's innovations...

NEW TIMES: In the West many of those who studied the Lysenko phenomenon, in particular David Joravsky in his book, "The Lysenko Affair," maintain that such occurrences are inherent in the socialist model of society, that they will keep appearing again and again, though under different conditions and on a different scale. What do you think of that?

A. Shamin: I can't agree with these assertions. Closer to the truth, to my mind, are works by Soviet sociologists, particularly those by Academician Zaslavskaya, who says that in any society there will always exist social groups with their own specific interests.

The situation has changed dramatically and today the rise of a new Lysenko is hardly possible. But there might still appear social and economic conditions in which certain groups (perhaps draped in respectable academic robes) could try to revive administrative methods in science and introduce ideological or other unscientific forms of evaluation of work in natural sciences. This is quite feasible, although any precise imitations of the Lysenko phenomenon are doomed to failure, since the development of our society has excluded this possibility.

We hope that the findings of our committee will help to prevent another Lysenko phenomenon, whatever form it might assume...

The committee has just started its work. We are interested in the fate of every scientist, every laboratory and shall appreciate all evidence that could prove useful in our efforts.

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